

SIEMENS



Field Instruments for Process Automation

Process Automation

Catalog
FI 01

Edition
2015

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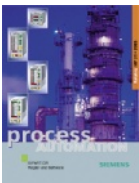
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Process Automation



Catalog FI 01 · 2015

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The products contained in this catalog can also be found
in the Interactive Catalog CA 01.

Article No.: E86060-D4001-A500-D5 (DVD)

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Pressure Measurement

1

Temperature Measurement

2

Flow Measurement

3

Level Measurement

4

Positioners

5

Process Protection

6

Additional Components

7

Communication and Software

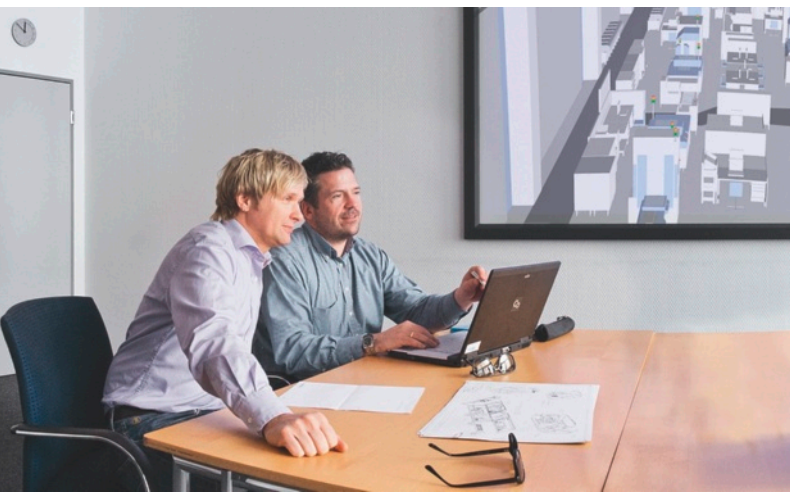
8

Appendix

9



The products and systems described in
this catalog are manufactured/distributed
under application of a certified quality
management system in accordance with
DIN EN ISO 9001





Answers for industry.

Integrated technologies, vertical market expertise and services for greater productivity, energy efficiency, and flexibility.

The Siemens Industry Sector is the world's leading supplier of innovative and environmentally friendly products and solutions for industrial companies. End-to-end automation technology and industrial software, solid market expertise, and technology-based services are the levers we use to increase our customers' productivity, efficiency and flexibility. With a global workforce of more than 100 000 employees, the Industry Sector comprises the Industry Automation, Drive Technologies, and Customer Services divisions, as well as the Metals Technologies Business Unit.

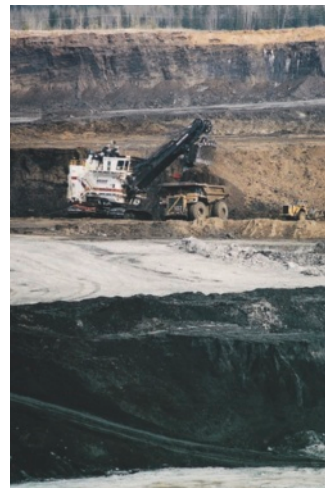
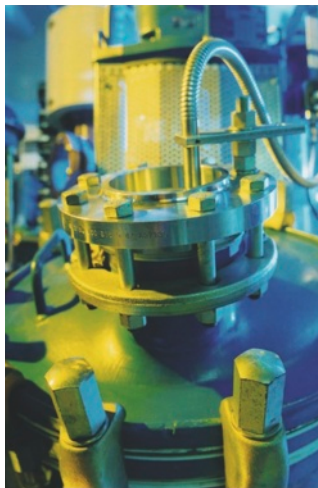
We consistently rely on integrated technologies and, thanks to our bundled portfolio, we can respond more quickly and flexibly to our customers' wishes. With our globally unmatched range of automation technology, industrial control and drive technology as well as industrial software, we equip companies with exactly what they need over their entire value chain – from product design and development to production, sales and service. Our industrial customers benefit from our comprehensive portfolio, which is tailored to their market and their needs.

Market launch times can be reduced by up to 50% due to the combination of powerful automation technology and industrial software from Siemens Industry. At the same time, the costs for energy or waste water for a manufacturing company can be reduced significantly. In this way, we increase our customers' competitive strength and make an important contribution to environmental protection with our energy-efficient products and solutions.

Industries

In the field of process instrumentation, process analytics and weighing technology, Siemens focuses on a number of key industries such as:

- Chemical
- Pharmaceutical
- Water/wastewater
- Mining, aggregates, cement
- Oil and gas/hydrocarbon processing
- Pulp and paper
- Food and beverage
- Marine



Process Instrumentation

Siemens offers a comprehensive range of process instruments for pressure, temperature, flow and level measurement. Pneumatic valve positioners, process controllers, process recorders and process protection devices complete the package. Whether you need a single instrument or a complete instrumentation package, Siemens is your professional supplier for any project.

Pressure Measurement



SITRANS P comprises a complete range of instruments for measuring gauge, differential and absolute pressure. In addition to high measuring precision and ruggedness, defining features include the convenience and functionality of a modular system as well as the perfect safety concept. We have a proven range of products for all pressure applications.



SITRANS P500

Digital transmitter for high precision applications with unmatched specifications for total performance and long term stability.



[1]



[2]



[3]



[4]

Overview of the SITRANS P range:

■ SITRANS LH100 [1]

Convenient hydrostatic level measurement.

SITRANS LH100 submersible pressure transmitter is used for hydrostatic level measurements. It is immersed in the process connected by a vented cable. The sensor has a stainless steel enclosure and is suitable for applications ranging from drinking water to corrosive liquids.

■ SITRANS P200/210/220 [2]

The fixed range transmitter for gauge and absolute pressure.

SITRANS P200: ceramic diaphragm

SITRANS P210: stainless steel diaphragm

SITRANS P220: stainless steel diaphragm fully welded

■ SITRANS P250 [3]

Fixed range transmitter for differential pressure.

The differential pressure will be detected with a ceramic sensor and transformed into an output signal of 4–20 mA-, 0–5 V resp. 0–10 V.

■ SITRANS P280 [4]

The SITRANS P280 is a WirelessHART pressure transmitter that provides all measured process values as well as diagnostic information, parameters and functions via wireless communication. The device is powered by an internal battery and designed for ultralow power consumption. The compact and rugged design makes it specially suitable for direct mounting on tanks and pipes in remote parts of plants, and on moving or rotating equipment for process monitoring or asset management applications.

Pressure Measurement



■ SITRANS P Compact [1]

For the special requirements of the food and beverage, pharmaceutical and biotechnology industries.

The increased hygiene demands are satisfied by a range of stainless steel process connections. Cleaning and sterilization procedures (CIP, SIP) are standard practice.

■ SITRANS P300 [2]

offers measuring precision and ruggedness, and advanced operation. The SITRANS P300 was designed for the food and beverage industry as well as pharmaceutical processes. It is an integral component of the SITRANS P family because of its measurement deviation of less than 0.075%, a hygienic stainless steel housing with laser-etched nameplate, and the proven SITRANS P DS III local operating philosophy.

The SITRANS P300 meets the requirements of the EHEDG, FDA and 3A. This makes it ideal for applications in the food and pharmaceutical industries.

You can read the process data via a HART, PROFIBUS PA or Fieldbus FOUNDATION protocol. The SITRANS P300 is also available combined with absolute or relative pressure measuring cells with flush mounted diaphragms. A wide range of process connections are available for the food and beverage, pharmaceutical, and paper industries, including threaded and flanged versions.

■ SITRANS P DS III [3]

Digital transmitters with integral diagnostics function, HART, PROFIBUS PA or Fieldbus Foundation communication, and convenient key operation. Within a range from 1 mbar to 700 bar, the SITRANS P DS III works well even with extreme chemical and mechanical loads or electromagnetic influences. It offers additional safety functions such as plant and self-monitoring, fault diagnostics and provides maintenance messages advising when the next calibration is due. The self-test function is unique for fail-safe operation. Measuring cells can be quickly and easily replaced so that on-site repairs are fast, simple and cost-effective. In addition to convenient local operation, SITRANS P transmitters can be connected to networks using the PROFIBUS PA, Foundation Fieldbus, or HART protocol.

SITRANS P DS III is designed for nominal pressures up to PN 420 (5800 psi). The wetted parts are available in stainless steel, Tantalum, Hastelloy, Monel, or gold plated. Explosion-proof versions are also available. The high safety level is documented by globally recognized certificates, including ATEX, SIL, CENELEC, FM, CSA, NEPSI. It is tested according to the NAMUR guidelines.



[4]



[5]

■ SITRANS P500 [4]

Digital transmitters for high precision applications.

The SITRANS P500 ensures a maximum reference accuracy below 0.03 % of calibrated span up to a turndown of 10:1. Combined with its low static pressure and temperature errors, it guarantees a total performance of 0.09 % up to a turndown of 5:1 and 0.14 % up to a turndown of 10:1.

The excellent long-term sensor stability reduces recalibration costs and gives you the measurement that you can trust on the long run. The cutting edge design of the measurement cell allows use at process temperatures up to 257 °F (125 °C) without requiring a remote seal system.

In case of critical applications where fast response times are required the SITRANS P500 helps to keep your plant safe thanks to its step response time (T63) of only 88 ms.

The configuration of the device can be done via standard HART-protocol compatible tools and also using the local push buttons and LCD display.

SITRANS P500 offers an easy-to-understand multilingual plain text menu which includes a rich set of diagnostic features and a quick start wizard for a simple, error-free configuration. The graphic display of the transmitter can be used to show trends and enables process monitoring.

This transmitter is available for different ranges to be used for differential pressure and level applications. In addition the transmitter can be combined with different kinds of remote seals.

■ Remote seals [5]

The measuring possibilities of the SITRANS P line are extended by a wide range of remote seals. These seals are used when measuring hot, corrosive, highly viscous, or crystallizing material. The following types of remote seals are available:

- Flanges according to EN, ASME, and other connections, either rigid connection to the transmitter or via flexible capillary.
- Various filling liquids for temperatures of material up to 400 °C (750 °F).
- Various diaphragm material options.
- Special versions specific to each industry.

Temperature Measurement



The instruments in the SITRANS T line are true temperature measurements, even under extreme conditions. Whether high or low temperatures or hazardous areas, the SITRANS T with communications capability can meet all demands in a wide variety of industries.



SITRANS TS500
Temperature Sensors for a
wide range of applications



[1]



[2]

Whether you require a sensor, head, rail or field-mounted transmitter, or a complete measuring station – we can offer you this individually or as a complete package.

The cost-effective SITRANS T transmitters can measure accurately in any application, and can be connected simply and rapidly to thermocouples or resistance thermometers. You can set the parameters using the intelligent SIMATIC PDM software package in no time at all, and without input errors. The following units are available:

Transmitters for head-mounting

■ SITRANS TH100 [1]

Pt100 transmitter. Low-cost and compact, configurable using PC (SIPROM T).

■ SITRANS TH200 [2]

Universal transmitter, configurable using PC (SIPROM T). Cost-saving service features.

■ SITRANS TH300 [2]

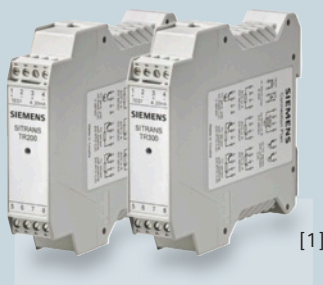
HART universal transmitter, configurable using SIMATIC PDM or HART protocol. Cost-saving service features. Diagnostics and simulation functions, remotely or locally.

■ SITRANS TH400 [2]

Fieldbus transmitter in designs for PROFIBUS PA or FOUNDATION Fieldbus.

Configurable using SIMATIC PDM (PA) or AMS (FF). Comprehensive diagnostics and simulation functions, transmission of important device and process data over the bus cable.

Temperature Measurement



[1]



[2]



[3]



[4]

Transmitters for rail-mounting

■ SITRANS TR200 [1]

Universal transmitter programmable via PC (SIPROM T). Cost-saving operational functions and diagnostics LED.

■ SITRANS TR300 [1]

HART universal transmitter configurable via SIMATIC PDM or HART protocol. Cost-saving operational functions and diagnostics LED. Remote or local diagnostics and simulation.

■ SITRANS TW [2]

Universal 4-wire transmitter for rail-mounting with HART communication, comprehensive diagnostics and simulation functions, configurable using SIMATIC PDM, optional limit value relay.

Transmitters for field-mounting

■ SITRANS TF [3]

Transmitter for mounting in the field where excessive heat or vibrations are present at the measuring point; IP67 degree of protection, programmable, HART, PROFIBUS PA, FOUNDATION Fieldbus optional programmable digital display. Can also be used as remote display without transmitter for any 4 to 20 mA signal.

■ SITRANS TF280 [4]

is a WirelessHART temperature transmitter that provides all measured process values as well as diagnostic information, parameters and functions via radio. The device is powered by an internal battery and designed for ultralow power consumption. Its compact and rugged design makes it specially suitable for direct mounting on tanks and pipes in remote parts of plants, and on moving or rotating equipment for process monitoring or asset management applications.



SITRANS TS temperature sensors

■ SITRANS TS100 - cable sensors [5]

This cable temperature sensor product series comes with a direct mounted cable. As a basic or mineral-insulated version a wide field of application is supported. The installation is easy and flexible by using compression or soldering fittings. With the optional adapter surface measurement is simple to apply. The intrinsic safe version has the approval for operating even in zone 0 without an additional protection tube. In such application the excellent response time of the sensor will be an outstanding benefit.

■ SITRANS TS200 - compact sensors [6]

The compact temperature sensor series adds to the excellent benefits of our SITRANS TS100. Instead of the flexible cable, it comes with a fixed connection M12, Lemo etc.

■ SITRANS TS300 - for food and pharma [7]

Our food and pharma temperature sensor product series is featured with a wide range of appropriate process connections – the classical method. With the clamp-on temperature sensor Siemens strikes a new path. Comparable with built-in measurement regarding response time and accuracy the advantages especially at small pipe diameters are obviously. No welding and welding validation, no process disturbance, easy pigging, easy dismantling for recalibration.

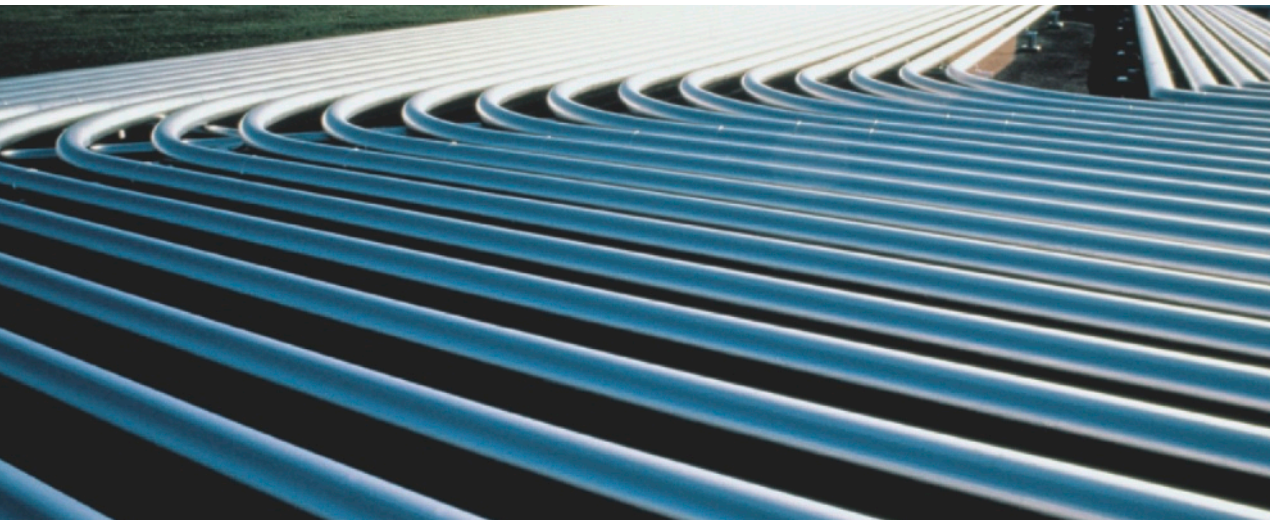
■ SITRANS T temperature sensors – special for high temperatures and flue gas [8]

Our flue gas resistance thermometers and straight thermocouples for combustion plants and furnaces.

■ SITRANS TS500 - for pipes and vessels [9]

The industry temperature sensor series supports a wide field of measurements, from simple applications up to solutions for harsh environments. Designed as a modular system of tubular or barstock thermowell, extension, connection head and optional transmitter and display, the customers profit from the use of standard components for individual applications. Intrinsic safe versions are available as well as Ex d.

Flow Measurement

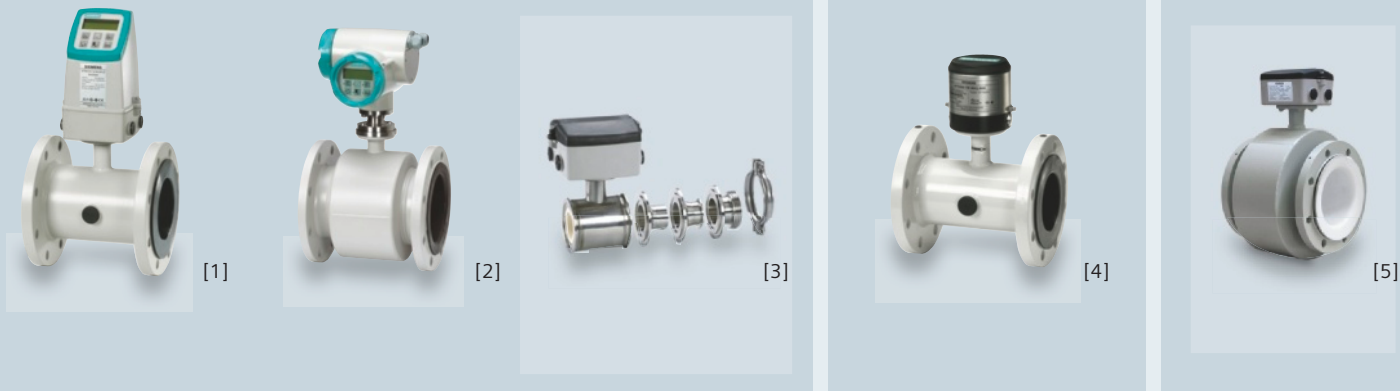


Choosing the right flowmeter for the right application can dramatically improve your bottom line. In all industries, Siemens offers a comprehensive selection of electromagnetic, Coriolis, ultrasonic, vortex, rotary piston and differential pressure flowmeters suitable for measuring a variety of liquids.



SITRANS FC430

The digitally based SITRANS FC430 features market-leading compactness, very high accuracy of 0.1%, low pressure loss, extremely stable zero point, best-in-class data update with 100 Hz high-speed signal transfer and the first SIL 3 certification on a Coriolis system. Unique support tools provide direct access to backup data, settings, certificates, and audit trails.



■ SITRANS F M – Electromagnetic flowmeters

measure the volume flow of electrically conductive fluids like e.g. water, chemicals, food and beverage, slurries, sludge, paper stock, and mining slurries with magnetic particles.

The SITRANS F M product range is divided into three meter types:

■ Modular pulsed DC meters

SITRANS F M DN 2 to DN 2000 (1/12" to 78")

- Full transmitter program MAG 5000/MAG 6000/MAG 6000 I compact or remote mounting.
- Multiple I/O as standard and communication modules PROFIBUS PA/DP, FOUNDATION Fieldbus, HART and Modbus RTU.
- MAG 5100 W [1] sensor designed for water and wastewater applications.
- MAG 3100 P designed for process industry and the harsh requirements in the chemical industry.
- MAG 3100/MAG 3100 HT [2] sensor for general process industry.
- MAG 1100/1100 HT sensor for general process industries.
- MAG 1100 F [3] sensor for food and beverage and pharmaceutical industries.

■ Battery-operated water meters

MAG 8000 DN 25 to DN 1200 (1" to 48") [4]

Designed for the water industry, the MAG 8000 program is a battery-powered solution that makes it easier than ever to install a reliable water meter virtually anywhere.

- Battery lifetime up to 6+ years.
- Mains powered 24V AC/DC, 115V AC/230V AC with battery backup.
- IP68 (NEMA 6P) enclosure for sensor and transmitter in compact or remote version.
- MAG 8000 for abstraction and distribution network.
- MAG 8000 CT for revenue and bulk metering.
- MAG 8000 Irrigation for agriculture.

■ High-powered AC meters

TRANSMAG 2 / 911/E DN 15 to DN 1000 (1/2" to 40") [5]

Specially designed for heavy mining slurries with or without magnetic particles as well as the most difficult applications in the pulp and paper industry.

- A wide choice of corrosion-resistant liner materials.
- Heavy duty industrial enclosure.
- No movable parts.

Flow Measurement



■ SITRANS F C Coriolis mass flowmeters

measure the direct mass flow rate of liquids and gases in almost any application.

It is a multivariable device delivering reliable information on mass flow, volume flow, temperature, density and concentration (e. g. Brix or Baume).

■ Flexibility and high performance with the MASS 6000 transmitter [4]

The flexible MASS 6000 transmitters are designed for high performance and easy operation ensuring a low cost of ownership.

■ Seamless integration with the SIFLOW FC070 module [2]

SIFLOW FC070 is a true multi-parameter Coriolis transmitter ready for quick installation and system integration into SIMATIC S7 and SIMATIC PCS 7 automation systems. SIFLOW FC070 is the most compact, space-saving and versatile module available.

■ Innovation and user-friendliness transmitter SITRANS FCT030

The FCT030 transmitter is based on the latest developments within digital signal processing technology – engineered for high measuring performance, fast response to step changes in flow, fast dosing applications, high immunity against process noise, easy installation and maintenance. The FCT030 can be remote connected or compact mounted with all sensors of type FCS400.

Sensors meeting the toughest challenges.

Optimum measuring performance is achieved through an intelligent sensor design with a strong focus on safety, repeatability, and quality, enabling a high accuracy

0.1 % of rate with a large turndown ratio. Sensor of capacity ranges from few g/h to 510 000 kg/h (few oz/h to 1 124 300 lb/h), covering applications ranging from mini-plants to bulk loading.

■ FCS400 sensors DN 15 - DN 80 in standard, hygienic (3A, EHEDG) and NAMUR versions [1] 0 to 136 000 kg/h (0 to 300 000 lb/h)

Fulfill the need for high performance at Chemical, Food & Beverage, Pharma and Hydrocarbon applications. Market-leading compactness saves space and money, with enough flexibility for installation anywhere and the ability to fit multiple units into tight spaces.

■ MASS 2100 DI 1.5 [3] 0 to 65 kg/h (0 to 143 lb/h):

Ideal for low flow applications measuring liquid or gas.

■ FC300 DN 4 0 to 350 kg/h (0 to 772 lb/h):

Low flow sensor with focus on compactness and machine integration.

■ MASS 2100 DI 3 – DI 40 [4] 0 to 52 000 kg/h (0 to 114 600 lb/h):

Medium range sensors for general purpose applications.

■ FCS200 DN 10 – DN 25 [5] 0 to 30 000 kg/h (0 to 66 138 lb/h)

Ideal for measuring in CNG (Compressed Natural Gas) applications.

■ Standard MC2 DN 50 – DN 150 0 to 510 000 kg/h (0 to 1 124 300 lb/h):

Large sensors offering ideal fit between size and maximum flow capacity.



[6]



[7]



[8]



[9]

■ SITRANS F US ultrasonic flowmeters

are available as in-line and clamp-on versions. Both meter types can be used with homogeneous conductive and non-conductive liquids and gases (only clamp-on). In addition to standard volume flow, they can also provide information on media quality and temperature. Meter calibration can be certified to industry standards.

■ In-line ultrasonic flowmeters [6]

Ultrasonic in-line flowmeters are suitable for industrial applications with pipe sizes ranging from DN 50 to DN 1200 (2" to 48"). Full 2-track and 4-track sensors are available in combination with the SITRANS FUS060 transmitter.

- Option between mild and stainless steel sensors.
- Transducers can be exchanged without interrupting operation.

■ Retrofit flowmeter type, SONOKIT [7]

The SONOKIT system up to DN 4000 (160") is designed for in-line retrofitting on all existing pipelines as a 1-track or 2-track flowmeter. The unique design enables installation on empty pipes or pipes under pressure without process shut-down.

- Robust version can be buried and withstands constant flooding.
- Outstanding accuracy; the bigger the pipe, the more accurate the result.

■ SITRANS FUS380 [8] and FUE380

For the utility industry the 2-track flowmeters, SITRANS FUS380 and FUE380, are designed to measure water flow in district heating plants, local networks, boiler stations, substations and other general water applications.

- Custody transfer approvals for district heating custody transfer applications.
- Battery or mains power enables installation where needed. Battery lifetime up to 6 years.
- Ideal for energy metering together with the SITRANS FUE950 [9] energy calculator.

Flow Measurement



■ Clamp-on ultrasonic flowmeters

The key feature of the clamp-on ultrasonic flow technology is the externally mounted sensors. They are quickly and easily installed on the outside of the pipe, making them the perfect choice for retro-fit applications and applications where corrosive, toxic or high pressure liquids and gases rule out the option of cutting the pipe. The technology provides highly accurate measurement of both liquids and gases on pipes ranging from DN 6 to DN 9140 (0.25" to 360") in size.

Clamp-on ultrasonic flowmeters are available in seven different families suitable for a wide range of industries and applications:

- SITRANS FUS1010 [1] for general industry
- SITRANS FUP1010 [2] portable meter
- SITRANS FUE1010 for HVAC
- SITRANS FUH1010 for hydrocarbon
- SITRANS FUG1010 for gas
- SITRANS FST020 [3] for basic water, wastewater and HVAC applications
- SITRANS FUT1010 [4] for hydrocarbon liquid and gas applications

Most families are available in single, dual or four channel configurations that offer great cost saving options. The dual channel version can be set up on two separate applications and can also provide arithmetic functions between the two channels. The 4-channel meter does not offer mathematical functions, but can monitor multi channels and paths.

The clamp-on ultrasonic flowmeters are also available as check metering kits for general liquid, water and wastewater, energy and gas applications. They all come in a sturdy rolling case, containing all the equipment necessary for performing flow measurement tasks. These kits are ideal for verifying existing applications regardless of measurement technology or application where no metering exists.

For the most basic flow applications, the SITRANS FST020 is the solution. It combines reliable measurement with simple configuration and set-up wrapped in a single channel design. It features an IP65 (NEMA 4X) enclosure, RS 232 communication and the WideBeam flow measurement technology (optional).

The SITRANS FUT1010 is available in a liquid and gas version. With performance meeting OIML R 117 and API recommendations, the ultrasonic flowmeter can be used for numerous upstream, midstream and downstream measurement tasks. A wide variety of sensor sizes ensures availability for virtually any application, including custody transfer applications where the permanent TransLoc system allows laboratory calibration.



■ SITRANS F X – Vortex flowmeters

provide accurate standard volumetric and mass flow measurement of steam, gases, conductive and non-conductive liquids. The Vortex flowmeter functions as an “All-in-one-solution” with integrated temperature and pressure compensation together with an optional energy calculation.

It is specially designed for applications that require reliable flow measuring independent of pressure, temperature, viscosity and density. This makes it perfectly applicable in especially the chemical industry, HVAC & power, food & beverage, oil & gas and pharma.

The SITRANS F X Vortex flowmeters are available as flanged or sandwich versions in the following configurations:

■ SITRANS FX300 [5]

- Volumetric flowmeter. Measurement of steam, gases, conductive and non-conductive liquids. Temperature compensation for saturated steam included in basic version as standard.
- Mass flowmeter. With pressure and temperature compensation for mass and standard volume flow measurement of gases or superheated steam. Integrated temperature and pressure sensors.
- Option with pressure sensor and isolation valve allows the pressure sensor to be shut off for the purpose of pressure or leak testing of the pipeline or for being exchanged without interrupting the process.

■ SITRANS FX300 dual transmitter [6]

- Dual measurement for twofold reliability.
- Redundant system with two independent sensors and two converters.

■ SITRANS LUT400 [7]

Reliable for open channel flow monitoring in water/ wastewater and plant effluent applications. Non-contact Echomax series ultrasonic transducers are used to complete the control system.

■ SITRANS F R – rotary piston meters [8]

Used to measure the volume flow of conductive and non-conductive liquids. High viscosity media, acids and alco-holbased concentrates are accurately recorded. Even measurements subject to calibration standards can be undertaken. No inflow and outflow runs required.

■ SITRANS F O – differential pressure flowmeters [9]

Universal flow measurement for liquids, gases and vapors. Always provide accurate results even with large bores, high temperature and extreme pressure.

Level Measurement



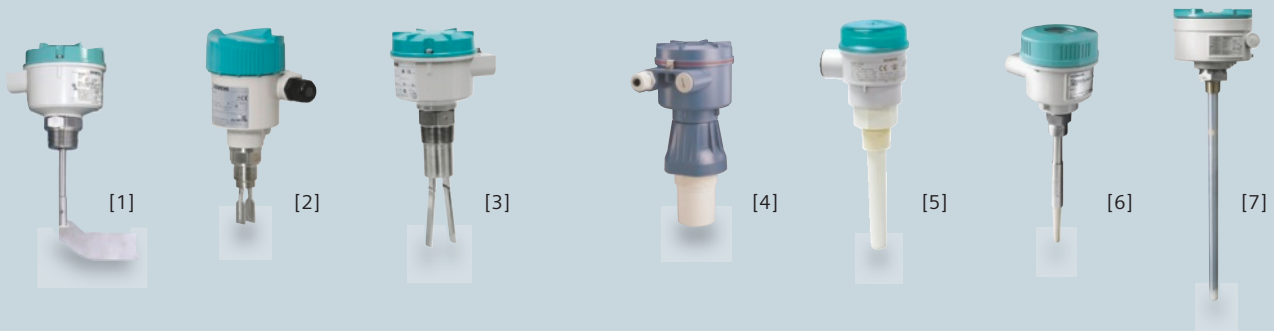
Siemens level measurement instruments serve process industries worldwide, including water and wastewater, aggregate, cement, mining, dry-bulk storage, chemical, petrochemical, oil and gas, food and beverage, and pharmaceutical. A wide portfolio of technologies and products lets you choose the right solution for your application.



SITRANS LUT400

features industry-leading 1 mm (0.04") accuracy, setup in under a minute, and intuitive local user interface navigation. The controller is compatible with the full line of Siemens Echomax transducers, with an operating range of 0.3 to 60 meters (1 to 200 feet), depending on transducer.

Key applications: wet wells, reservoirs, flumes/weirs, chemical storage, liquid storage, hoppers, crusher bins, dry solids storage



POINT LEVEL DETECTION

■ Vibration, rotary paddle and tilt

Siemens rotary or vibrating point level switches are a cost-effective solution for solids and liquids applications. Their robust design lasts in harsh and abrasive environments. They detect high, low, and demand levels in solids, liquids and slurry applications, specializing in low bulk density applications. We offer a wide variety of configuration options suitable for any environment. SITRANS vibration and rotary paddle switches are simple to use with no complicated setup or configuration. Standard aluminum enclosures and a wide variety of process connections provide exceptional resistance to mechanical forces, long service life, and low cost of ownership.

- SITRANS LPS200 [1] rotary paddle switch detects solids with densities as low as 15 g/l (0.94 lb/ft³).
- SITRANS LVL100 and LVL200 [2] vibrating level switches for liquid and slurry applications, including high, low, and demand level alarms and pump protection.
- SITRANS LVS100 and LVS200 [3] vibratory switch detects solids with densities as low as 5 g/l (0.3 lb/ft³).

■ Ultrasonic

Pointek ULS200 [4] is a non-contacting ultrasonic level switch with two switch points, effective in bulk solids, liquids, and slurries, and is ideal for sticky materials.

■ Capacitance

Siemens Pointek inverse frequency shift capacitance point level switches provide accurate, reliable, and repeatable measurement in dusty, turbulent, and vaporous environments or applications with product buildup. Small changes in level create large changes in frequency. As a result Pointek devices have greater sensitivity and consistently outperform conventional devices. With their robust aluminum enclosures and process connections, Siemens Pointek switches are proven superior performers in liquids, solids, slurries and interfaces.

- Pointek CLS100 [5] – compact 2- or 4- wire switch for level detection in constricted spaces, interfaces, solids, liquids, slurries, and foam.
- Pointek CLS200 and CLS300 [6] – level switch for detecting liquids, solids, slurries, foam, and interfaces even in demanding conditions where high pressure and temperatures are present.
- Pointek CLS500 [7] – level switch for critical conditions of more extreme temperatures and pressures.

Level Measurement



CONTINUOUS LEVEL MEASUREMENT

Sonic Intelligence and Process Intelligence

Our patented Sonic Intelligence and Process Intelligence signal processing technologies were developed using knowledge provided by our field service engineers and data from devices installed in real applications. Siemens instruments offer the unique advantage of this technology. Both signal processing technologies differentiate between true echoes from the material and false echoes from obstructions or electrical noise. The sophisticated software is continually updated and supported by field data gained from more than a million applications. This in-depth knowledge and experience is built into the software's advanced algorithms to provide intelligent processing of echo profiles. The result is a repeatable, fast and reliable measurement you can trust.

■ Radar

Even in harsh process conditions, Siemens radar transmitters are virtually unaffected. Non-contacting radar technology means low maintenance and provides reliable continuous level measurement for short to long-range applications.

Siemens offers a variety of radar instruments. Process Intelligence signal processing software ensures reliable and accurate level measurement and features Auto False-Echo Suppression, a technique that can automatically detect and suppress false echoes from vessel obstructions. This ensures high performance and is easy to implement, using just a few parameter entries on the infrared handheld interface or via configuration tools such as SIMATIC PDM, Pactware, or AMS.

- SITRANS Probe LR [1] – 2-wire, 6 GHz pulse radar level transmitter for basic continuous monitoring of liquids and slurries in storage vessels with nominal pressure and temperature, to a range of 20 m (66 ft).
- SITRANS LR200 [2] – 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids. Ideally suited for complex, turbulent process vessels including high temperatures and pressures to a range of 20 m (66 ft).
- SITRANS LR250 [3] – 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage/process vessels including high temperature and pressure, to a range of 20 m (66 ft). Ideal for small vessels and low dielectric media.
- SITRANS LR260 [4] – is a 2-wire 25 GHz pulse radar level transmitter for continuous monitoring of solids and liquids in storage vessels including extreme levels of dust and high temperatures, to a range of 30m (98.4 ft).
- SITRANS LR460 [5] – 4-wire, 24 GHz FMCW radar level transmitter for continuous monitoring of solids in vessels to a range of 100 m (329 ft). Ideal for applications with extreme dust and high temperatures to 200 °C (392 °F) and very bulk density/low dielectric media.
- SITRANS LR560 [6] – 2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids. Very narrow 4 degree beam angle with 3" lens antenna. For ranges up to 100 m (328 ft).



[7]



[8]



[9]



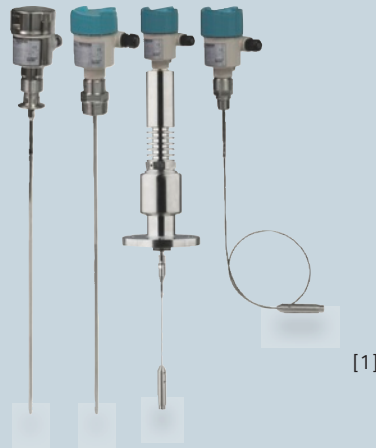
[10]

■ Ultrasonic

Siemens is the world leader in ultrasonic level technology. SITRANS LUT400 is an easy to use and highly accurate level, volume and pump controller. For advanced solutions controllers are available with remotely mounted non-contacting ultrasonic transducers. Whether you select the transmitter or the controller you get a cost-effective non-contacting solution for a wide range of applications in virtually any industry.

- SITRANS Probe LU [7] – 2-wire, loop powered ultrasonic transmitter for level/volume/flow monitoring of liquids in storage vessels, simple process vessels, and open channels.
- SITRANS LUT400 [8] – Compact, single point ultrasonic controller for continuous level or volume measurement of liquids, slurries, and solids, and high accuracy monitoring of open channel flow.
- Rugged Echomax transducers [9] are built for harsh environments. They are impervious to dust, moisture, corrosion, vibration, flooding, and extreme temperature. They are easy to install and virtually maintenance-free.
- HydroRanger 200 [10] – Level controller for up to 6 pumps including pump control, differential control, and open channel flow monitoring.

Level Measurement

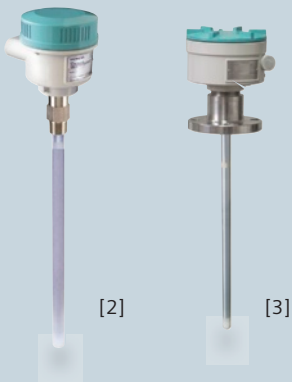


■ Guided Wave Radar

uses Time Domain Reflectometry (TDR) to measure level by guiding an electromagnetic pulse down a probe (solid steel rod, steel cable or coaxial probe) toward the material. When the pulse reaches the material surface, the change in dielectric value between air and the material causes a portion of the pulse to reflect back toward the transmitter. Guided wave radar is unaffected by vapor, density, foam, dielectric fluctuations, temperature, and pressure changes, and works well for short and medium-range measurements, and materials with low dielectric constants such as liquified gases. Interface of two liquids (i. e. oil/water) can also be measured with both level and interface reported over the HART output.

■ SITRANS LG series [1]

- SITRANS LG240 – For use in hygienic application environments.
- SITRANS LG250 – Highly flexible solution for liquid level and interface applications. Extremely versatile for many applications.
- SITRANS LG260 – Ideal for measuring level in medium range solids applications including grains, plastics and cement.
- SITRANS LG270 – Offers configuration options for extreme conditions including high temperature and high pressure applications.



■ Capacitance

Our unique inverse frequency shift approach to capacitance technology ensures accurate, reliable, and repeatable measurement, even in dusty, turbulent, and vaporous environments, or in situations with product buildup. Because even a small level change creates a large change in frequency, our instruments provide better resolution and consistently outperform conventional devices. With special features such as Active-Shield technology, and modular probe options available on various models, they offer practical solutions to a wide variety of continuous level, and interface applications.

- SITRANS LC300 [2] is an inverse frequency shift capacitance continuous level transmitter for liquids and solids applications. It is ideal for industrial applications in chemical, hydrocarbon processing, food and beverage, mining, aggregate and cement industries. Patented Active-Shield technology protects the measurement from the effects of moisture, vapors, foam, temperature or pressure variations, and material buildup.
- SITRANS LC500 [3] is an inverse frequency shift capacitance level or interface transmitter with active shield for critical applications, such as high-pressure coalescers, FPSO ships, LNG processing plants, cryogenic materials, and offshore oil and gas platforms. It performs in liquids, solids, interfaces, and foam and is unaffected by vapors, product deposits, dust, or condensation and is highly resistant to toxic and aggressive materials. SITRANS LC500 is the right solution if you're looking for high-precision level or interface measurement under extreme conditions.

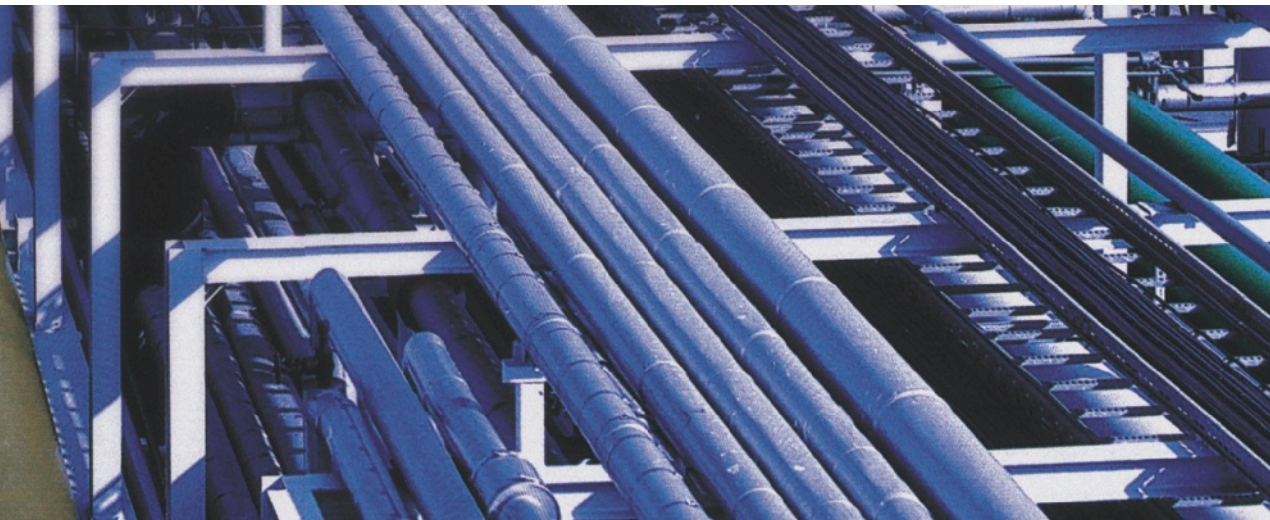
■ Hydrostatic

Low-cost level measurement for direct mounting or mounting with remote seals on tanks and vessels. SITRANS LH100 [4] and SITRANS P DS III [5] can handle extreme chemical and mechanical loads as well as electromagnetic interference. They are widely applied in the chemical and petrochemical industries.

■ Gravimetric

Gravimetric level measurement with SIWAREX [6] weighing technology offers highly precise measurement without material contact independent of medium temperature, tank shape, built-in parts and material characteristics.

Positioners



Positioners from Siemens have been guaranteeing safe and trouble-free operation around the globe for nearly 20 years. They accurately control every valve type and process, while handling special tasks with perfect reliability. We continually develop our product range to satisfy your exacting specifications and demands that your process requirements place on positioners.



SIPART PS2

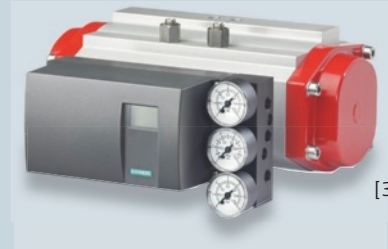
State-of-the-art positioner with innovative features such as optional external non contacting position detection and many more.



[1]



[2]



[3]

■ SIPART PS2 [1] [2] [3]

is currently the most widely used positioner for linear and part-turn actuators in a wide range of process industries. The proven all-round design has a particularly flexible stroke range, intelligent diagnostics, and different communication protocols.

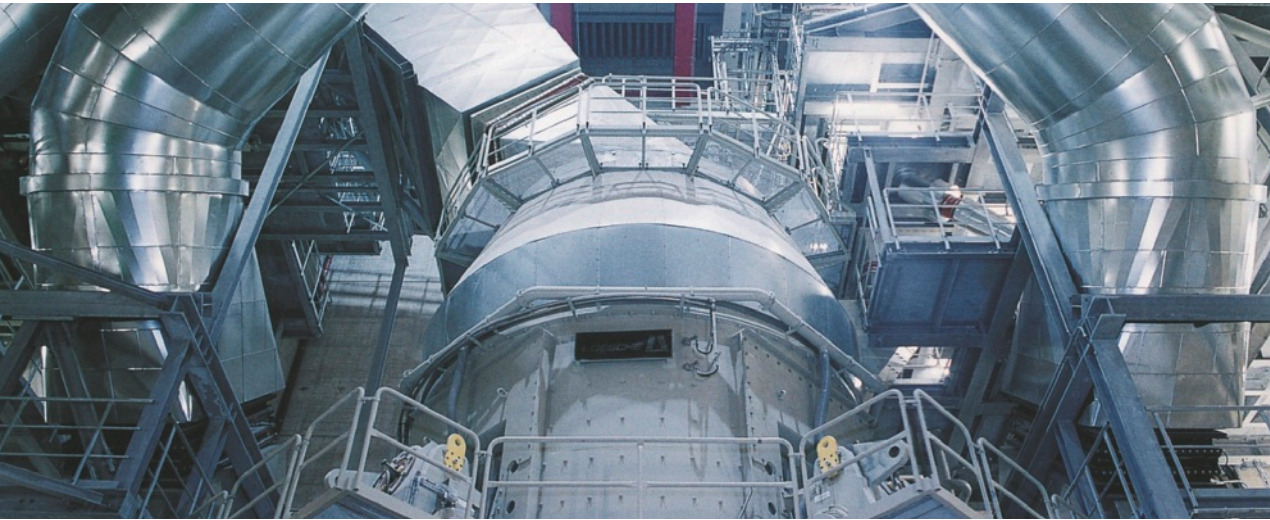
- Versions with external non-contacting travel sensors.
- High flexibility in the stroke range from 3 to 200 mm (0.1 to 7.9 inch) (more on request).
- Communication via PROFIBUS PA, FOUNDATION Fieldbus or HART.
- Ex d explosion-proof version.
- SIPART PS2 is available in Makrolon, aluminum and stainless steel casings.
- SIPART PS2 prevents the closing of fittings during the solenoid valve test, or monitors open/close fittings as an "intelligent solenoid valve".
- Extreme low air consumption to minimize total cost of ownership.

■ Extended online diagnostics

Our intelligent SIPART PS2 is equipped with comprehensive functionalities, and deliver diagnostic data on themselves, their environment and the valve and actuator. With these premium diagnostics, these positioners set the standards for cost efficiency, reduce maintenance requirements in the plant, guarantee safe process control, and provide high functional safety in emergency situations. The following valve and actuator failures can be detected.

- Friction and clogging of a valve.
- Pneumatic leakage (e. g. tear in actuator membrane).
- Growing deposits in a pipeline or tear of valve plug for continuous processes.
- Wear and tear of valve seat or valve plug.
- Deposits or incrustations on valve seat or valve plug.
- Stiction of stuffing box.
- "Partial Stroke Test" (PST) for open/close valves (e. g. safety valves, ESD) and control valves.

Process Protection



Detect to protect your process. Detect flow problems, blockages, screen faults, machinery slowdowns, or burst filter bags. Process protection devices can be an early warning system to avoid costly process interruptions and breakdowns of equipment. Rugged construction makes them impervious to dust, dirt, buildup and moisture.



SITRANS AS100

Acoustic sensor for material flow monitoring with compact stainless-steel design.



[1]



[2]



[3]



[4]

MOTION SENSORS

Non-contacting motion sensors detect changes in motion and speed of conveying, reciprocating and rotating machinery.

■ Milltronics MFA 4p with MSP or XPP probes [1]

This sensitive, single-setpoint motion sensor system can be used even in hazardous, high temperature, and harsh conditions because of its superior sensing probe design. The system protects equipment by detecting absence of motion, as well as underspeed or overspeed conditions.

■ SITRANS WM100 [2]

This heavy-duty, zero-speed alarm switch detects absence or presence of motion of rotating, reciprocating or conveying equipment.

ACOUSTIC SENSORS

■ Acoustic sensors for material flow monitoring

The SITRANS AS100 [4] acoustic sensor detects high frequency acoustic emissions from friction or the impact of dust, powders, granules and other solids in motion. It signals flow/no flow or high/low flow. It features compact stainless steel construction for harsh environments and non-invasive mounting. The SITRANS AS100 can be connected to a SITRANS CU02 [3], which processes signals from the sensor, providing relay and analog outputs for connection into a process, or it can be connected directly to a PLC analog input.

Supplementary Components



Supplementary Components are designed to work with most types of instrumentation to provide enhanced functionality such as seamless wireless communications, remote displays, and remote monitoring solutions. Customers can add Ethernet, web, logging and other functions to instruments.



SITRANS RD500 [5]
remote data manager provides
remote monitoring solutions
for instrumentation anytime,
anywhere via the web.



REMOTE DIGITAL DISPLAYS

- SITRANS RD100 [1] loop powered remote display, and RD200 [1] universal remote digital displays make measurement data visible and accessible from a remote location. They can be used with all types of field instruments in varying process conditions, and are easy to set up and program. SITRANS RD200 includes freely available logging and monitoring software, allowing multiple displays to be monitored from one PC.

REMOTE DATA MANAGER

- SITRANS RD500 [5] is a remote data manager providing remote monitoring through datalogging, web access and alarming for instrumentation. It offers integrated web and ftp server, email and sms for alarming, and up to 2 gigabytes for data-logging of instrumentation with no programming required. It enables remote monitoring of inventory levels, process and environmental applications, and provides web access to most types of field instrumentation, including flow, level, pressure, temperature measurement and weighing. With SITRANS RD500 it is as simple as typing an IP-address in your web browser to access the data from remotely installed instrumentation. SITRANS RD500 collects and sends sensor data to logistics systems providing up to date, timely and accurate information used in decision making. Without the need for additional software you bring data from remote instrumentation via Ethernet or Modem (PSTN/GSM/GPRS) to your desktop, no matter where you are or where your instruments are.

WirelessHART Accessories

- The SITRANS AW210 [2] and the SITRANS AW200 [3] are WirelessHART adapter for normal or for hazardous areas which allows standard wired HART/4 ... 20 mA devices to be connected to a WirelessHART network. By installing the SITRANS AW200 on an existing analog-wired HART device, users can utilize all diagnostic information at the maintenance station without any risk of impairing operation. It is possible to connect also several devices to one adapter. Due to its battery the SITRANS AW200 is able to supply also the connected field device with electrical power.
- The IE/WSN-PA LINK [4] is a WirelessHART gateway for connecting a WirelessHART network to a plant host application. With the integrated network manager it is easy to configure WirelessHART networks and optimize network performance and security settings.

The link also supports redundancy in both ways, to the WirelessHART network and to plant host applications. Funktion block libraries allow easy integration of WirelessHART into the process control system SIMATIC PCS 7 and into PLC families S7-300 and S7-400.

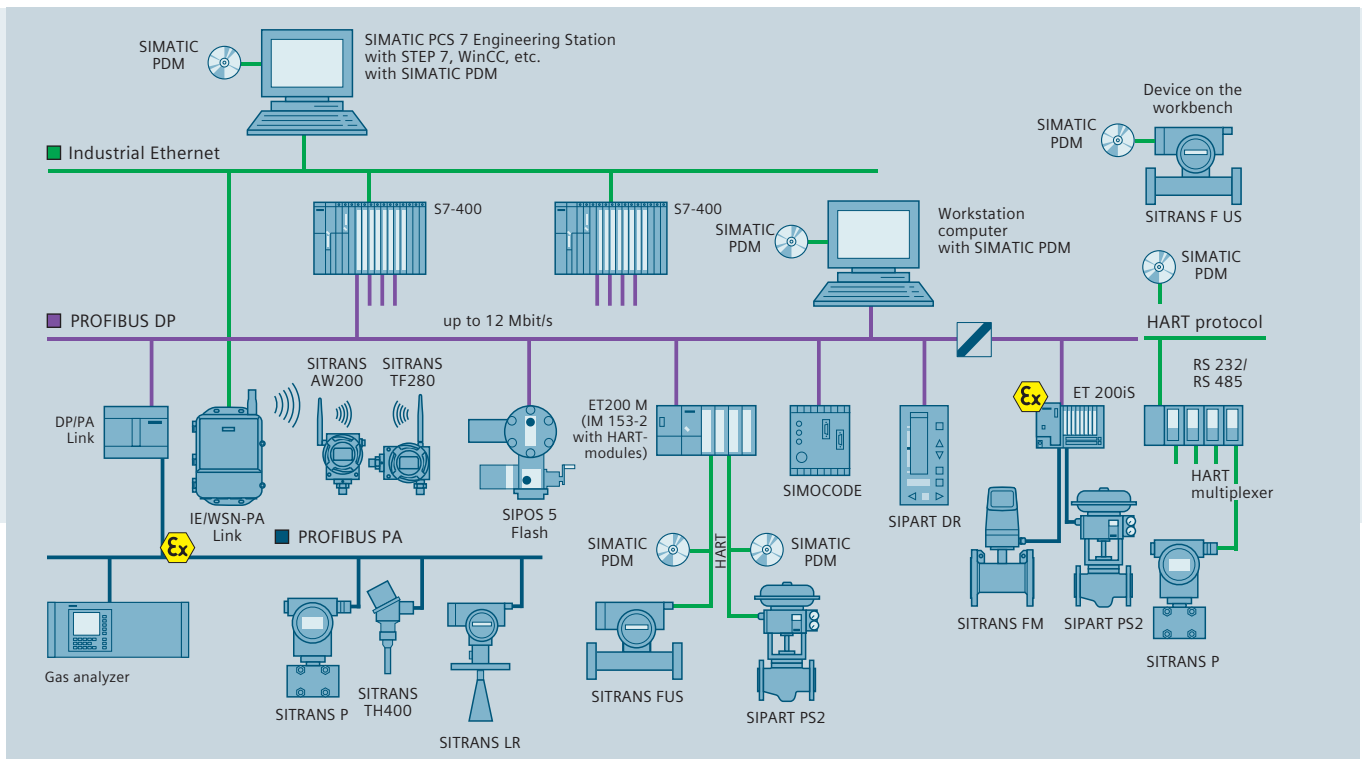
Communication and Software



Reliable communication between process devices and control systems is essential for efficient and safe processes. With different communication protocols and the necessary software Siemens offers the right tools to integrate their process instruments and analyzers into the world of process automation. The platform of Totally Integrated Automation from Siemens ensures a high level of transparency at all plant levels – from the field up to the production control level and the corporate management level.



SITRANS MDS
(Maintenance and Diagnostic Station)
is a Windows-based application for
retrieving and managing maintenance
information from field devices.



■ SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a universal, non-proprietary tool for the configuration, parameterization, commissioning, diagnostics and maintenance of intelligent field devices (sensors and actuators) and field components (remote I/Os, multiplexers, control room devices, compact controllers).

Over 1,200 process devices from more than 100 manufacturers are supported by SIMATIC PDM. The design and function of the devices can be described using the Electronic Device Description Language (EDDL), based on the leading EDD international standard (Electronic Device Description; IEC 61804).

SIMATIC PDM uses this to automatically create an easy-to-use interface providing the required information on the process devices. The latest release of this standard allows the implementation of state-of-the-art user interfaces:

- Intuitive Quick Start Wizards
- Enhanced graphical interface

Communication with process devices is by HART, PROFIBUS or alternative protocols. SIMATIC PDM can be used as a universal parameterization tool as well as in the integrated version in the SIMATIC Step7/PCS 7 environment.

SIMATIC PDM meets all requirements from field level to various types of industrial communication and central engineering service and maintenance.

■ Asset Management

comprises all activities and measures designed to maintain or increase the value of a plant. This primarily includes value-enhancing service and maintenance (plant-specific asset management) in addition to business management, process management and process optimization. Because of its comprehensive functionality SIMATIC PDM is particularly suited to provide the device data required for plant-specific asset management and transfer it to higher-level asset management systems in XML format via a uniform interface. However, SIMATIC PDM is much more than just a data logger for higher-level asset management systems. It offers a wide range of asset management functions as well.

Communication and Software



■ PROFIBUS

Decentralized automation solutions based on open field buses are currently standard in many areas of the production and process industry. The benefits of digital communication can be fully exploited in combination with field buses, including improved resolution of measurement values, diagnostics options and remote parameterization.



PROFIBUS is currently the most successful open field bus, providing a flexible platform for a variety of applications. Based on the IEC 61158 standard, it is a reliable investment and suitable for fast communication in production and process automation. It is the first field bus and meets the requirements of both sectors with the same communication performance.

WirelessHART®



PROFIBUS PA is tailored to the requirements of the process industry, handling both the power supply for the devices and communication between the devices and higher-level systems.

PROFIBUS PA is intrinsically safe and can be used in hazardous areas.

■ FOUNDATION Fieldbus

Field devices for measuring pressure, temperature, flow, level and actuators are also available for the intrinsically safe FF bus. Communication via FF is also based on the EDD standard and thus also offers the benefits of digital communication.



■ HART – field communication protocol

The HART communication standard is used by more than 30 million installed smart process instruments with increasing numbers. The standard is managed by the HCF (HART Communication Foundation) and extends analog 4–20 mA signals to modulated, industry-quality, digital HART signals. The advantage is the combination of tried-and-tested analog measurement-value transfer and simultaneous digital communication with bi-directional, acyclic transfer. This allows transfer of diagnostics, maintenance and process information from field devices to higher-level systems. Standardized parameter sets can be used for the non-proprietary operation of all HART devices.

Enhanced electronic device descriptions (EDD) are used to integrate HART devices into the SIMATIC PDM.

This ensures simple operation and commissioning of field devices, even in inaccessible locations.

■ WirelessHART

is an intelligent advancement of the proven wired 4–20 mA HART technology towards wireless communication as part of HCF Specification V7. WirelessHART is backward compatible with wired HART technology, and as such offers maximum protection for investments in hardware and software, tools and expertise. WirelessHART is designed to communicate measured process variables or setpoints via the network but also diagnostic and maintenance information and parameters. WirelessHART uses state-of-the-art security technologies to ensure network and data protection. These are e.g. meshed network topology including redundancy, data encryption, message integrity, etc.

■ SITRANS DTM

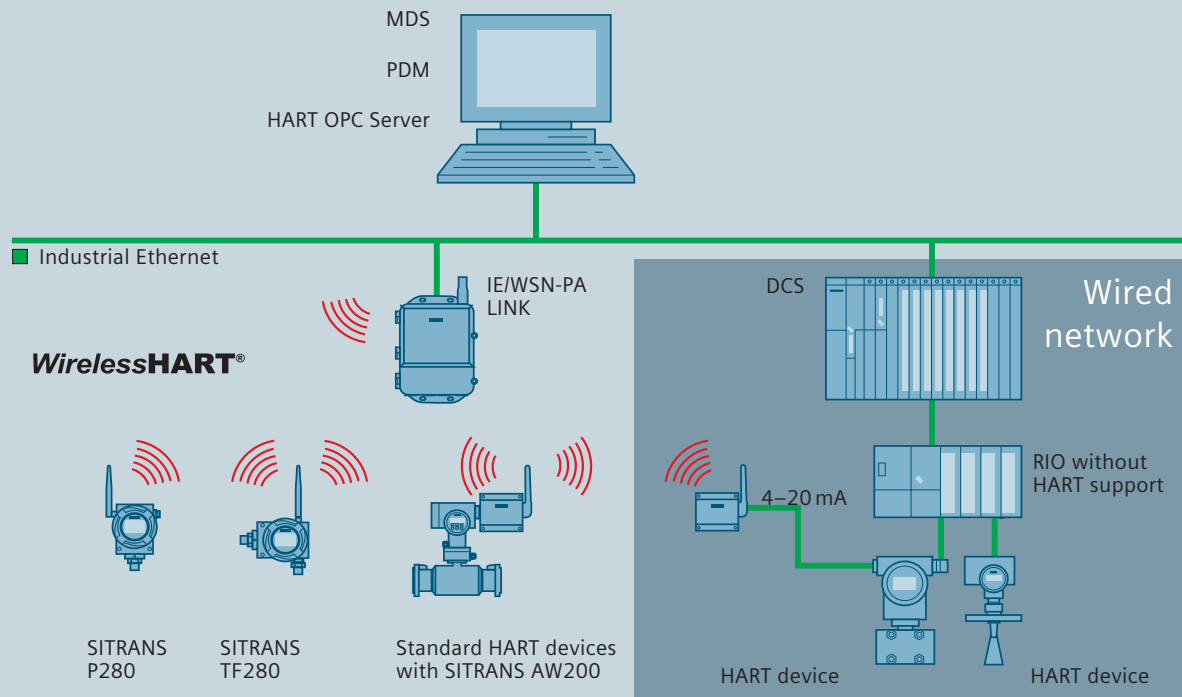
Enhanced electronic device descriptions (EDD) are used to integrate field devices in SIMATIC PDM or other tools like AMS.

Some tools in the market like PACTware or Fieldcare are based on a technique called FDT (Field Device Tool). SITRANS DTM integrates EDDs from our devices in these FDT-based tools.

■ Emerson AMS

Many of Siemens HART and FF devices also have EDDs designed for AMS by Emerson.

Communication and Software

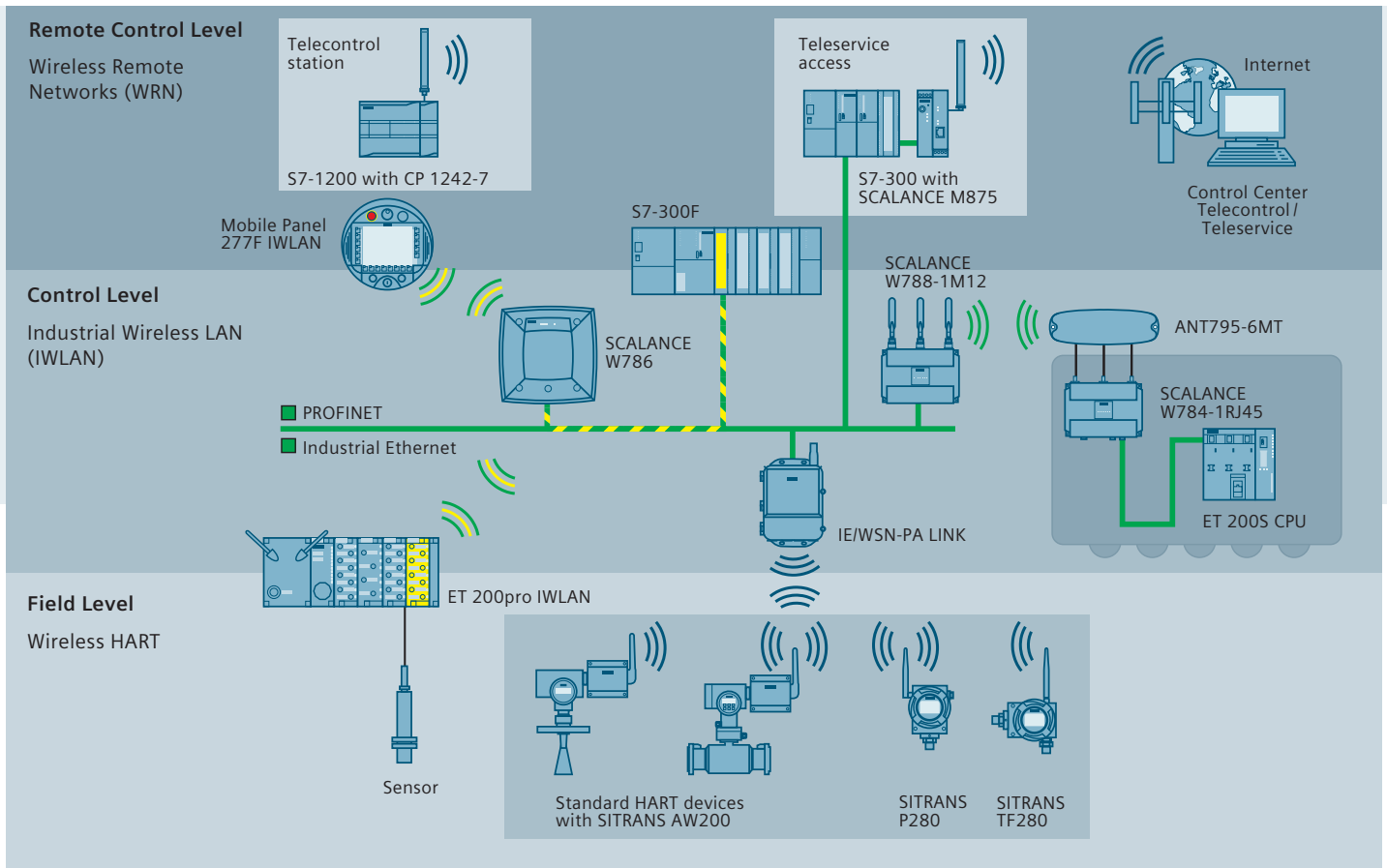


■ SITRANS MDS

(Maintenance and Diagnostic Station) is a Windows-based application for retrieving and managing maintenance and diagnostic information from field devices.

Features:

- Use of SIMATIC PDM to retrieve maintenance and diagnostic.
- All devices reachable by SIMATIC PDM are supported.
- Device list is shown in tree form, with properties and maintenance information in a column on the right-hand side.
- Selectable update interval for all devices.
- Visualization of the maintenance status with SIMATIC-specific icons or NAMUR (NE 107) icons.
- Archiving of recent events for each device.
- User-editable report.



WirelessHART®

Success factor Industrial Wireless Communication

Industrial Wireless LAN (IWLAN) and GSM/GPRS-based wireless wide area networks play a successful and important part at control and remote control level.

WirelessHART answers your challenge and opens up new communication options.

- Flexible for installation, replacement or upgrading; ideal for temporary measurements and on moving or rotating equipment.
- Cost-efficient for remote and difficult to access facilities: significant cost savings for cabling, commissioning and engineering. Reduced operating costs thanks to increased plant efficiency and lower maintenance expenditure.
- Maintenance-friendly thanks to access to valuable diagnostic information.
- High plant availability and production quality due to cost-effective measurement points and higher transparency throughout the plant.

The optimum use of wired and wireless devices in one system creates the best basis for a new standard of performance in automation.

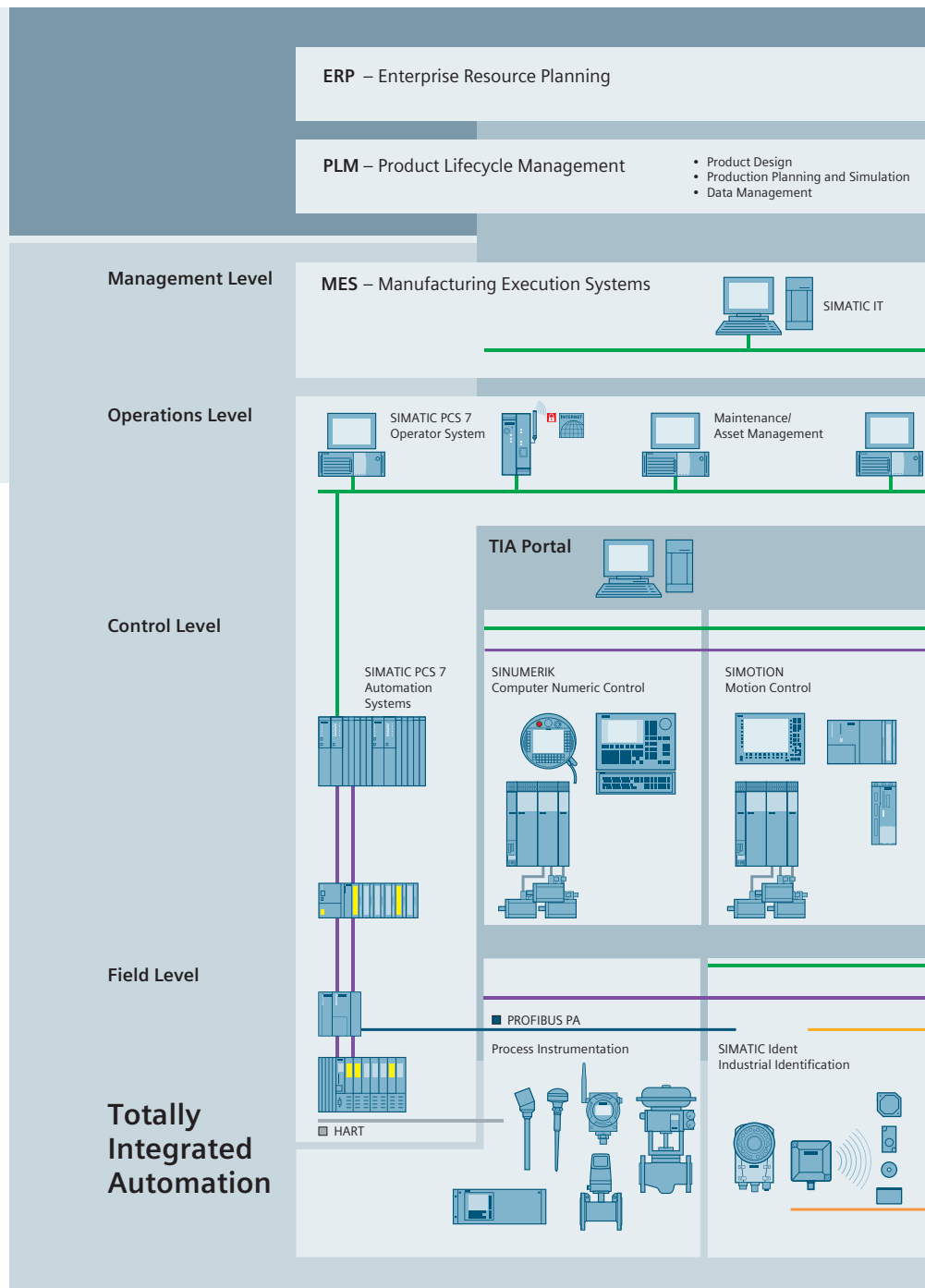
Communication and Software

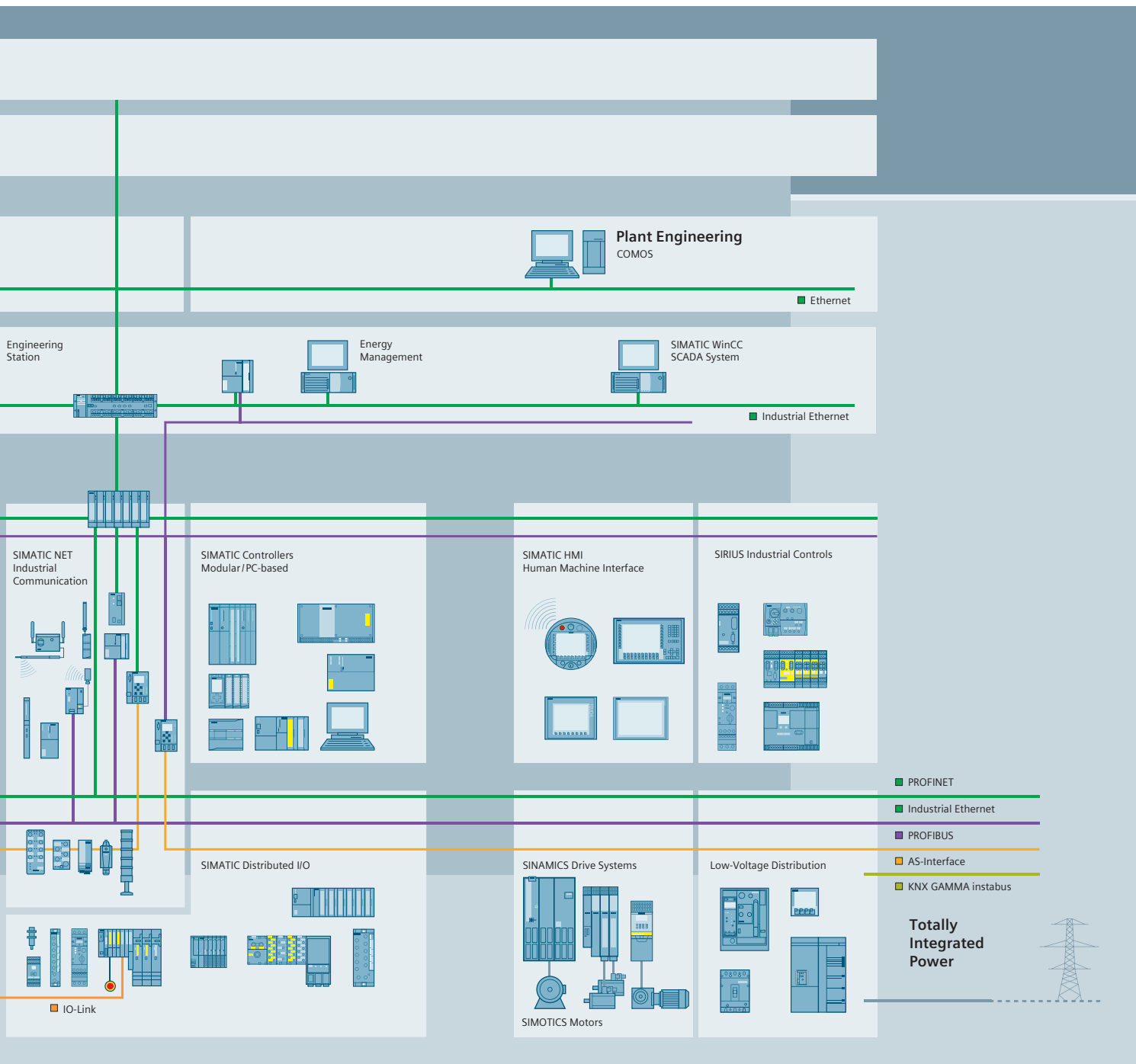
■ Totally Integrated Automation – TIA

is characterized by its unique degree of integration which ensures a high level of transparency at all plant levels – from the field level to the production control level and the corporate management level. This concept provides considerable benefits throughout the entire plant life cycle, from the initial planning and engineering stages, commissioning, operations and maintenance right through to modernization. The process instruments designed by Siemens have been perfectly integrated into the TIA concept.

The SIMATIC PDM (Process Device Manager) is used as a central parameterization tool to allow the user continuous access to all the field devices of his plant.

Thanks to modern fieldbus communication like HART, PROFIBUS or FOUNDATION Fieldbus the field devices can be integrated into the overall plant. By integrating the devices into the PCS7 Asset Management system the user receives diagnostics information from the field devices whenever he needs it, allowing him to optimize the servicing and maintenance of his plant and avoid downtime.





Complete Solutions



Siemens offers a complete service package to assist you in engineering, designing, supplying, installing and commissioning measurement solutions for complete industrial plants. In addition, we guarantee seamless after-sales service based on user-friendly documentation of the solution and your plant.

Real-world measurement technology from Siemens is a multifaceted offering. For example, we provide all field instruments from a single source, as requested by many customers. Our "one-stop shopping" approach includes both sensors and actuators. Siemens supports integrated engineering of your complete process instrumentation all the way to integration with your process control system. Additional industrial components and systems integrate seamlessly into the overall plant and ensure smooth process flows.

Overview of our services portfolio:

- Plant engineering and scheduling by an experienced project management team.
- Specialists assist you in the selection and use of the field instruments.
- SIPLAN C/E is state-of-the-art software available for effective plant engineering and order processing. This program is also very useful for providing actual customer documentation.

■ Plant documentation comprises:

- Basic documentation, including device specifications, product and use lists.
- Higher-level documentation, including plant, process, identification and grounding concepts.
- Mechanical documentation, including setup and installation diagrams, hookups, cable routings.
- Electrical documentation, including circuit and wiring diagrams, cable lists.

■ Specification and delivery of all required process instruments.

■ Intensive preparation for installation.

■ Reliable supply of installation material.

■ Installation and/or installation supervision.

■ Commissioning and/or commissioning supervision.

■ Comprehensive after-sales service.







Regardless of the solution we offer you, the focus is always on customer value.

Pressure Measurement

Product overview

1

Overview






	Application	Description		Software for parameterization
SITRANS P · Transmitters for basic requirements				
	Two or three-wire transmitters for measuring gauge and absolute pressure	SITRANS P200 <ul style="list-style-type: none"> • Single-range transmitters for gauge and absolute pressure • Ceramic measuring cell • For general applications SITRANS P210 <ul style="list-style-type: none"> • Single-range transmitters for gauge pressure • Stainless steel measuring cell • For low-pressure applications SITRANS P220 <ul style="list-style-type: none"> • Single-range transmitters for gauge pressure • Stainless steel measuring cell, fully welded • For high-pressure applications and refrigeration technology 	1/5 1/11 1/16	– – –
	Two or three-wire transmitter for measuring differential pressure	SITRANS P250 <ul style="list-style-type: none"> • Compact single-range transmitters • Analog electronics • Available ex stock 	1/22	–
	Two-wire transmitter for measuring hydrostatic levels	SITRANS LH100 <i>NEW</i> <ul style="list-style-type: none"> • For measuring liquid levels in wells, tanks, channels, dams etc. • With ceramic diaphragm, Ø 23.4 mm 	1/27	–
	Two-wire transmitter for measuring hydrostatic levels	SITRANS P MPS <ul style="list-style-type: none"> • For measuring liquid levels in wells, tanks, channels, dams etc. • With stainless steel diaphragm, Ø 27 mm 	1/31	–
	Transmitters for gauge and absolute pressure for food, pharmaceuticals and biotechnology	SITRANS P Compact <ul style="list-style-type: none"> • Single-range transmitters in two-wire system • Hygiene-based design with various aseptic connections according to EHEDG, FDA and GMP recommendations. 	1/36	–
SITRANS P · Transmitters with WirelessHART communication				
	Wireless transmitter with Wireless HART for measuring gauge and absolute pressure	SITRANS P280 <ul style="list-style-type: none"> • Wireless communication with WirelessHART • Battery operation • Parameterization using 3 buttons and SIMATIC PDM with HART modem or wireless with WirelessHART 	1/45	SIMATIC PDM

Application	Description	Software for parameterization
SITRANS P · Transmitters for food, pharmaceuticals and biotechnology		
 	<p>Two-wire transmitters for measuring gauge and absolute pressure</p> <p>SITRANS P300</p> <ul style="list-style-type: none"> • Hygiene-based design according to EHEDG, 3A, FDA and GMP • Parameterization using 3 buttons and communication over HART, PROFIBUS PA or FOUNDATION Fieldbus • Standard process connection G1/2", 1/2-NPT and front-flush process connections available • Range adjustment 100 : 1 	1/50 SIMATIC PDM
	<p>Factory-mounting of valve manifolds on SITRANS P300 transmitters</p> <ul style="list-style-type: none"> • Simplified assembly • With pressure test • Stainless steel valve manifolds 	1/71 –
SITRANS P · Transmitter for gauge pressure for the paper industry		
	<p>Two-wire transmitters for measuring gauge pressure</p> <p>SITRANS P300 and SITRANS P DS III with PMC connection for the paper industry</p> <ul style="list-style-type: none"> • Range adjustment 100 : 1 • Process connections for the paper industry • Parameterization using 3 buttons and HART, PROFIBUS PA or FOUNDATION Fieldbus 	1/73 SIMATIC PDM
SITRANS P · Transmitter for general requirements		
	<p>Two-wire transmitters for measuring:</p> <ul style="list-style-type: none"> • Gauge pressure, • Absolute pressure, • Differential pressure and • Flow or • Level 	1/90 SIMATIC PDM
	<p>Supplementary electronics for adaptation of two-wire transmitters for four-wire connections</p>	1/164 –
	<p>Factory mounting of valve manifolds on gauge, absolute or differential pressure transmitters SITRANS P DS III</p> <ul style="list-style-type: none"> • Simplified assembly • With pressure test • Stainless steel valve manifolds 	1/172 –

Pressure Measurement

Product overview

1

	Application	Description		Software for parameterization
SITRANS P - Transmitters for High Performance requirements				
	Two-wire transmitters for measuring: <ul style="list-style-type: none"> • Differential pressure • Volume flow • Mass flow • Level • Volume • Mass 	SITRANS P500 <ul style="list-style-type: none"> • Range adjustment: 200 :1 • High measuring accuracy • Very fast response time • Extremely good long-term stability Parameterization: <ul style="list-style-type: none"> • 3 buttons or HART 	1/176	SIMATIC PDM
	Supplementary electronics for adaptation of two-wire transmitters for four-wire connections	Output: 0/4 ... 20 mA Power supply: 24 V AC/DC, 230 V AC	1/198	–
		Factory-mounting of manifolds on differential pressure transmitters SITRANS P500 <ul style="list-style-type: none"> • Simplified assembly • With pressure test • Stainless steel valve manifolds 	1/203	–
Remote seals for transmitters and pressure gauges				
	Remote seals for measuring viscous, corrosive or fibrous media (as well as media at extreme temperatures)	Remote seals in sandwich and flange designs Quick-release remote seals for the food industry Wide range of diaphragm materials and fill fluid available	1/206	–
Fittings				
	Shutting off the lines for the medium and differential pressure Mounting of transmitter on valve manifold or shut-off fitting	Shut-off fittings and valve manifolds available in steel, brass or stainless steel Valve manifolds available for the various process connections of the SITRANS P transmitters	1/258	–

Pressure Measurement

Transmitters for basic requirements

SITRANS P200 for gauge and absolute pressure

1

Overview



The SITRANS P200 pressure transmitter measures the gauge and absolute pressure of liquids, gases and vapors.

- Ceramic measuring cell
- Gauge and absolute measuring ranges 1 to 60 bar (15 to 1000 psi)
- For general applications

Benefits

- High measuring accuracy
- Rugged stainless steel enclosure
- High overload withstand capability
- For aggressive and non-aggressive media
- For measuring the pressure of liquids, gases and vapors
- Compact design

Application

The SITRANS P200 pressure transmitter for gauge and absolute pressure is used in the following industrial areas:

- Mechanical engineering
- Shipbuilding
- Power engineering
- Chemical industry
- Water supply

Design

Device structure without explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65), a round plug M12 (IP67), a cable (IP67) or a Quickon cable quick screw connection (IP67) connected electrically. The output signal is between 4 and 20 mA or 0 and 10 V.

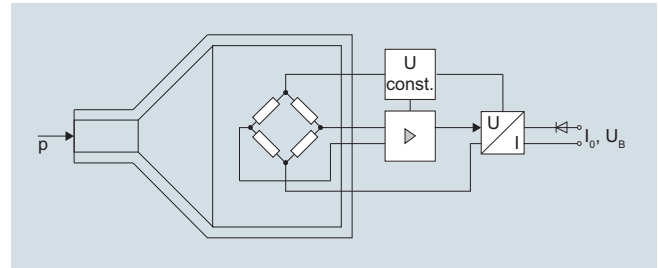
Device structure with explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65) or a round plug M12 (IP67) connected electrically. The output signal is between 4 and 20 mA.

Function

The pressure transmitter measures the gauge and absolute pressure of liquids and gases as well as the level of liquids.

Mode of operation



SITRANS P200 pressure transmitters (7MF1565-...), functional diagram

The ceramic measuring cell has a thin-film resistance bridge to which the operating pressure p is transmitted through a ceramic diaphragm.

The voltage output from the measuring cell is converted by an amplifier into an output current of 4 to 20 mA or an output voltage of 0 to 10 V DC.

The output current and voltage are linearly proportional to the input pressure.

Pressure Measurement

Transmitters for basic requirements

SITRANS P200 for gauge and absolute pressure

Technical specifications

Application	Liquids, gases and vapors
Mode of operation	
Measuring principle	Piezo-resistive measuring cell (ceramic diaphragm)
Measured variable	Gauge and absolute pressure
Inputs	
Measuring range	
• Gauge pressure	
- Metric	1 ... 60 bar (15 ... 870 psi)
- US measuring range	15 ... 1000 psi
• Absolute pressure	
- Metric	0.6 ... 16 bar a (10 ... 232 psia)
- US measuring range	10 ... 300 psia
Output	
Current signal	4 ... 20 mA
• Load	$(U_B - 10 \text{ V})/0.02 \text{ A}$
• Auxiliary power U_B	DC 7 ... 33 V (10 ... 30 V for Ex)
Voltage signal	0 ... 10 V DC
• Load	$\geq 10 \text{ k}\Omega$
• Auxiliary power U_B	12 ... 33 V DC
• Power consumption	< 7 mA at 10 k Ω
Characteristic curve	Linear rising
Measuring accuracy	
Error in measurement at limit setting incl. hysteresis and reproducibility	<ul style="list-style-type: none"> • Typical: 0.25 % of full-scale value • Maximum: 0.5 % of full-scale value
Step response time T_{99}	< 5 ms
Long-term stability	
• Lower range value and measuring span	0.25 % of full-scale value/year
Influence of ambient temperature	
• Lower range value and measuring span	0.25 %/10 K of full-scale value
• Influence of power supply	0.005 %/V
Conditions of use	
Process temperature with gasket made of:	
• FPM (Standard)	-15 ... +125 °C (+5 ... +257 °F)
• Neoprene	-35 ... +100 °C (-31 ... +212 °F)
• Perbunan	-20 ... +100 °C (-4 ... +212 °F)
• EPDM	-40 ... +145 °C (-40 ... +293 °F), usable for drinking water
Ambient temperature	-25 ... +85 °C (-13 ... +185 °F)
Storage temperature	-50 ... +100 °C (-58 ... +212 °F)
Degree of protection (to EN 60529)	<ul style="list-style-type: none"> • IP 65 with connector per EN 175301-803-A • IP 67 with M12 connector • IP 67 with cable • IP 67 with cable quick screw connection
Electromagnetic compatibility	<ul style="list-style-type: none"> • acc. IEC 61326-1/-2/-3 • acc. NAMUR NE21, only for ATEX versions and with a max. measuring deviation $\leq 1 \%$

Design	
Weight	Approx. 0.090 kg (0.198 lb)
Process connections	See dimension drawings
Electrical connections	<ul style="list-style-type: none"> • Connector per EN 175301-803-A Form A with cable inlet M16x1.5 or ½-14 NPT or Pg 11 • M12 connector • 2 or 3-wire (0.5 mm²) cable ($\varnothing \pm 5.4 \text{ mm}$) • Quickon cable quick screw connection
Wetted parts materials	
• Measuring cell	Al ₂ O ₃ - 96 %
• Process connection	Stainless steel, mat. No. 1.4404 (SST 316 L)
• Gasket	<ul style="list-style-type: none"> • FPM (Standard) • Neoprene • Perbunan • EPDM
Non-wetted parts materials	
• Enclosure	Stainless steel, mat. No. 1.4404 (SST 316 L)
• Rack	Plastic
• Cables	PVC
Certificates and approvals	
Classification according to pressure equipment directive (PED 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
Lloyd's Register of Shipping (LR)	12/20010
Germanischer Lloyd (GL)	GL19740 11 HH00
American Bureau of Shipping (ABS)	ABS_11_HG 789392_PDA
Bureau Veritas (BV)	BV 271007A0 BV
Det Norske Veritas (DNV)	A 12553
Drinking water approval (ACS)	ACS 11 ACC NY 055
GOST	GOST-R
Underwriters Laboratories (UL)	
• for USA and Canada	UL 20110217 - E34453
• worldwide	IEC UL DK 21845
Explosion protection	
Intrinsic safety "i" (only with current output)	Ex II 1/2 G Ex ia IIC T4 Ga/Gb Ex II 1/2 D Ex ia IIIC T125 °C Da/Db
EC type-examination certificate	SEV 10 ATEX 0146
Connection to certified intrinsically-safe resistive circuits with maximum values:	$U_i \leq 30 \text{ V DC}$; $I_i \leq 100 \text{ mA}$; $P_i \leq 0.75 \text{ W}$
Effective internal inductance and capacity for versions with plugs per EN 175301-803-A and M12	$L_i = 0 \text{ nH}$; $C_i = 0 \text{ nF}$

Pressure Measurement

Transmitters for basic requirements

SITRANS P200 for gauge and absolute pressure

1

Selection and ordering data

SITRANS P 200 pressure transmitters for pressure and absolute pressure for general applications

Characteristic curve deviation typ. 0.25 %

Wetted parts materials: Ceramic and stainless steel + sealing material

Non-wetted parts materials: stainless steel

[Click on the Article No. for the online configuration in the PIA Life Cycle Portal.](#)

Article No.

Order code

7MF1565 -

Measuring range		Overload limit		Burst pressure		Article No.	Order code		
		Min.	Max.						
For gauge pressure									
0 ... 1 bar	(0 ... 14.5 psi)	-1 bar	(-14.5 psi)	2.5 bar	(36.26 psi)	> 2.5 bar	(> 36.3 psi) ▶◆	3 BA	
0 ... 1.6 bar	(0 ... 23.2 psi)	-1 bar	(-14.5 psi)	4 bar	(58.02 psi)	> 4 bar	(> 58.0 psi) ▶◆	3 BB	
0 ... 2.5 bar	(0 ... 36.3 psi)	-1 bar	(-14.5 psi)	6.25 bar	(90.65 psi)	> 6.25 bar	(> 90.7 psi) ▶◆	3 BD	
0 ... 4 bar	(0 ... 58.0 psi)	-1 bar	(-14.5 psi)	10 bar	(145 psi)	> 10 bar	(> 145 psi) ▶◆	3 BE	
0 ... 6 bar	(0 ... 87.0 psi)	-1 bar	(-14.5 psi)	15 bar	(217 psi)	> 15 bar	(> 217 psi) ▶◆	3 BG	
0 ... 10 bar	(0 ... 145 psi)	-1 bar	(-14.5 psi)	25 bar	(362 psi)	> 25 bar	(> 362 psi) ▶◆	3 CA	
0 ... 16 bar	(0 ... 232 psi)	-1 bar	(-14.5 psi)	40 bar	(580 psi)	> 40 bar	(> 580 psi) ▶◆	3 CB	
0 ... 25 bar	(0 ... 363 psi)	-1 bar	(-14.5 psi)	62.5 bar	(906 psi)	> 62.5 bar	(> 906 psi) ▶◆	3 CD	
0 ... 40 bar	(0 ... 580 psi)	-1 bar	(-14.5 psi)	100 bar	(1450 psi)	> 100 bar	(> 1450 psi) ▶◆	3 CE	
0 ... 60 bar	(0 ... 870 psi)	-1 bar	(-14.5 psi)	150 bar	(2175 psi)	> 150 bar	(> 2175 psi) ▶◆	3 CG	
Other version, add Order code and plain text: Measuring range: ... up to... bar (psi)								9 AA	H 1 Y
For absolute pressure									
0 ... 0.6 bar a	(0 ... 8.7 psia)	0 bar a	(0 psia)	3 bar a	(43.51 psia)	> 2.5 bar a	(> 36.3 psia)	5 AG	
0 ... 1 bar a	(0 ... 14.5 psia)	0 bar a	(0 psia)	2.5 bar a	(36.26 psia)	> 2.5 bar a	(> 36.3 psia) ▶◆	5 BA	
0 ... 1.6 bar a	(0 ... 23.2 psia)	0 bar a	(0 psia)	4 bar a	(58.02 psia)	> 4 bar a	(> 58.0 psia) ▶◆	5 BB	
0 ... 2.5 bar a	(0 ... 36.3 psia)	0 bar a	(0 psia)	6.25 bar a	(90.65 psia)	> 6.25 bar a	(> 90.7 psia) ▶◆	5 BD	
0 ... 4 bar a	(0 ... 58.0 psia)	0 bar a	(0 psia)	10 bar a	(145 psia)	> 10 bar a	(> 145 psia) ▶◆	5 BE	
0 ... 6 bar a	(0 ... 87.0 psia)	0 bar a	(0 psia)	15 bar a	(217 psia)	> 15 bar a	(> 217 psia) ▶◆	5 BG	
0 ... 10 bar a	(0 ... 145 psia)	0 bar a	(0 psia)	25 bar a	(362 psia)	> 25 bar a	(> 362 psia) ▶◆	5 CA	
0 ... 16 bar a	(0 ... 232 psia)	0 bar a	(0 psia)	40 bar a	(580 psia)	> 40 bar a	(> 580 psia) ▶◆	5 CB	
Other version, add Order code and plain text: Measuring range: ... up to ... mbar a (psia)								9 AA	H 2 Y
Measuring ranges for gauge pressure (only for US market)									
(0 ... 15 psi)		(-14.5 psi)		(35 psi)		(> 35 psi)		4 BB	
(3 ... 15 psi)		(-14.5 psi)		(35 psi)		(> 35 psi)		4 BC	
(0 ... 20 psi)		(-14.5 psi)		(50 psi)		(> 50 psi)		4 BD	
(0 ... 30 psi)		(-14.5 psi)		(80 psi)		(> 80 psi)		4 BE	
(0 ... 60 psi)		(-14.5 psi)		(140 psi)		(> 140 psi)		4 BF	
(0 ... 100 psi)		(-14.5 psi)		(200 psi)		(> 200 psi)		4 BG	
(0 ... 150 psi)		(-14.5 psi)		(350 psi)		(> 350 psi)		4 CA	
(0 ... 200 psi)		(-14.5 psi)		(550 psi)		(> 550 psi)		4 CB	
(0 ... 300 psi)		(-14.5 psi)		(800 psi)		(> 800 psi)		4 CD	
(0 ... 500 psi)		(-14.5 psi)		(1400 psi)		(> 1400 psi)		4 CE	
(0 ... 750 psi)		(-14.5 psi)		(2000 psi)		(> 2000 psi)		4 CF	
(0 ... 1000 psi)		(-14.5 psi)		(2000 psi)		(> 2000 psi)		4 CG	
Other version, add Order code and plain text: Measuring range: ... up to ... psi								9 AA	H 1 Y
Measuring ranges for absolute pressure (only for US market)									
(0 ... 10 psia)		(0 psia)		(35 psia)		(> 35 psia)		6 AG	
(0 ... 15 psia)		(0 psia)		(35 psia)		(> 35 psia)		6 BA	
(0 ... 20 psia)		(0 psia)		(50 psia)		(> 50 psia)		6 BB	
(0 ... 30 psia)		(0 psia)		(80 psia)		(> 80 psia)		6 BD	
(0 ... 60 psia)		(0 psia)		(140 psia)		(> 140 psia)		6 BE	
(0 ... 100 psia)		(0 psia)		(200 psia)		(> 200 psia)		6 BG	
(0 ... 150 psia)		(0 psia)		(350 psia)		(> 350 psia)		6 CA	
(0 ... 200 psia)		(0 psia)		(550 psia)		(> 550 psia)		6 CB	
(0 ... 300 psia)		(0 psia)		(800 psia)		(> 800 psia)		6 CC	
Other version, add Order code and plain text: Measuring range: ... up to ... psia								9 AA	H 2 Y

▶ Available ex stock

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Pressure Measurement

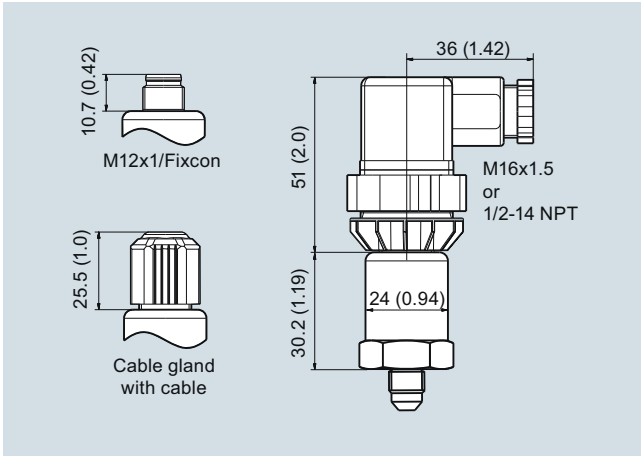
Transmitters for basic requirements

SITRANS P200 for gauge and absolute pressure

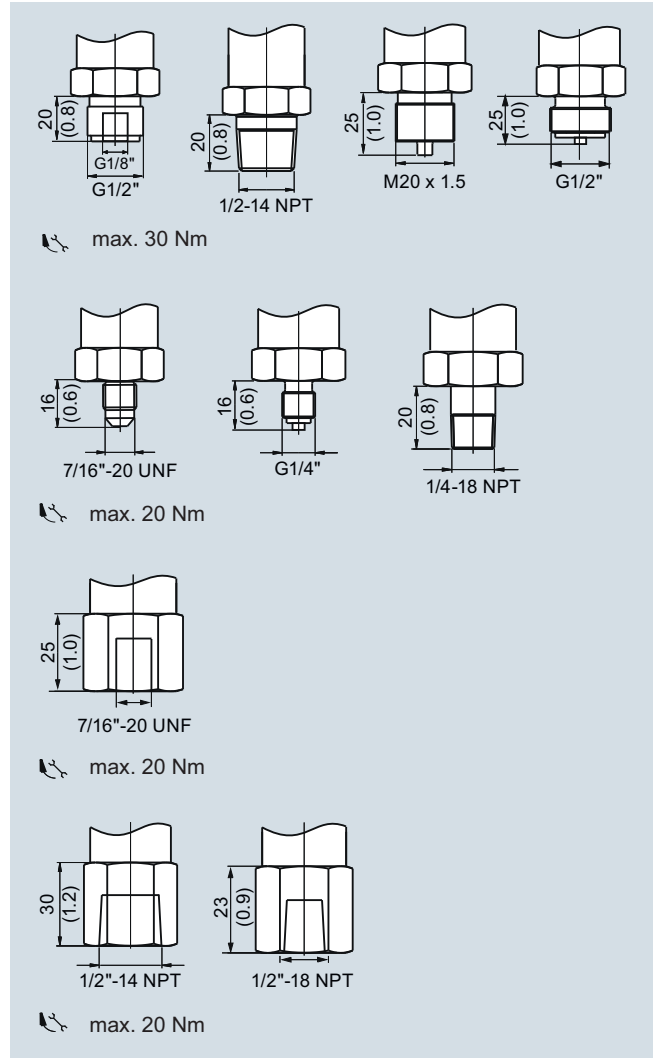
1

Selection and ordering data	Article No.	Order code
SITRANS P 200 pressure transmitters for pressure and absolute pressure for general applications Accuracy typ. 0.25 % Wetted parts materials: Ceramic and stainless steel + sealing material Non-wetted parts materials: stainless steel	7MF1565-	
Output signal 4 ... 20 mA; two-wire system; power supply 7 ... 33 V DC (10 ... 30 V DC for ATEX versions) ▶◆ 0 ... 10 V; three-wire system; power supply 12 ... 33 V DC		0 10
Explosion protection (only 4 ... 20 mA) None ▶◆ With explosion protection Ex ia IIC T4 ▶◆		0 1
Electrical connection Connector per DIN EN 175301-803-A, stuffing box thread M16 (with coupling) ▶◆ Round connector M12 per IEC 61076-2-101 (not for gauge pressure ranges ≤ 16 bar) Connection via fixed mounted cable, 2 m (not for type of protection "Intrinsic safety i") Quickon cable quick screw connection PG9 (not for type of protection "Intrinsic safety i") Connector per DIN EN 175301-803-A, stuffing box thread 1/2"-14 NPT (with coupling) Connector per DIN EN 175301-803-A, stuffing box thread PG11 (with coupling) Fixed mounted cable, length 5 m Special version		1 2 03 04 5 6 07 9 N1Y
Process connection G½" male per EN 837-1 (½" BSP male) (standard for metric pressure ranges mbar, bar) ▶◆ G½" male thread and G1/8" female thread G¼" male per EN 837-1 (¼" BSP male) 7/16"-20 UNF male ¼"-18 NPT male (standard for pressure ranges inH₂O and psi) ¼"-18 NPT female ½"-14 NPT male ½"-14 NPT female 7/16"-20 UNF female M20x1.5 male Special version		A B C D E F G H J P Z P1Y
Sealing material between sensor and enclosure Viton (FPM, standard) ▶◆ Neoprene (CR) Perbunan (NBR) EPDM Special version		A B C D Z Q1Y
Version Standard version ▶◆		1
Further designs Supplement the Article No. with "-Z" and add Order code. Manufacturer's test certificate M per IEC 60770-2 (calibration certificate) supplied Oxygen application, oil and grease-free cleaning (only in conjunction with the sealing material Viton between sensor and enclosure and not with explosion protection version) ▶ Available ex stock ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	C11 E10	

Dimensional drawings



SITRANS P200, electrical connections, dimensions in mm (inch)



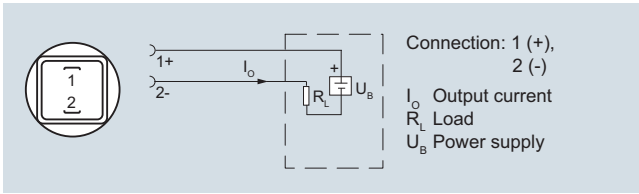
SITRANS P200, process connections, dimensions in mm (inch)

Pressure Measurement

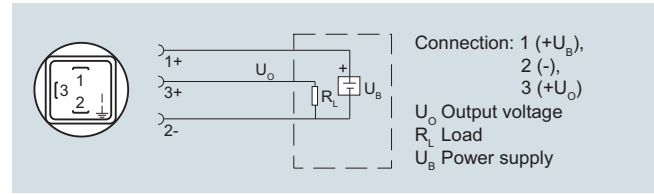
Transmitters for basic requirements

SITRANS P200 for gauge and absolute pressure

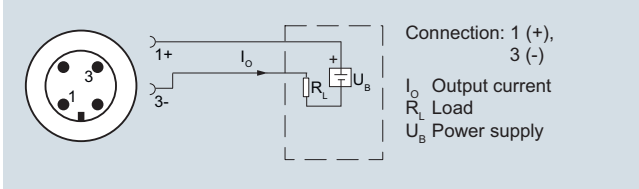
Schematics



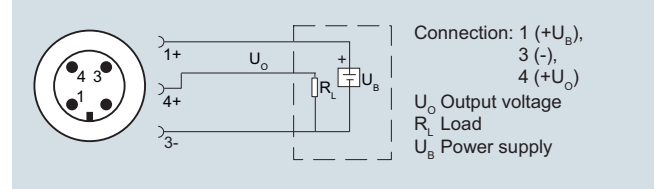
Connection with current output and connector per EN 175301



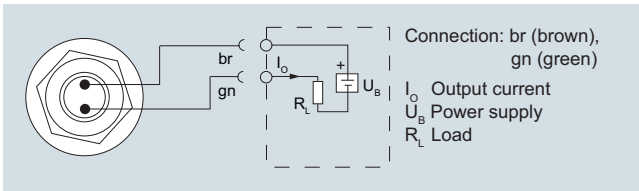
Connection with voltage output and connector per EN 175301



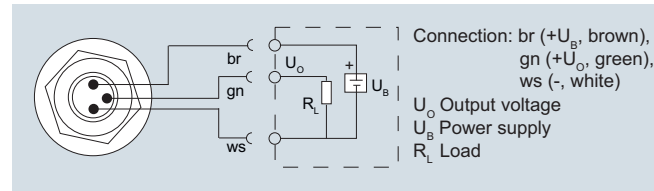
Connection with current output and connector M12x1



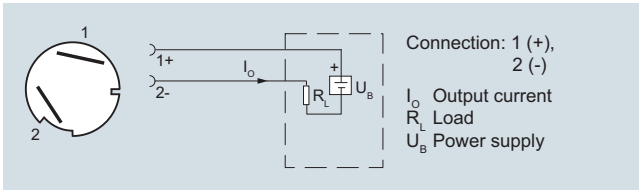
Connection with voltage output and connector M12x1



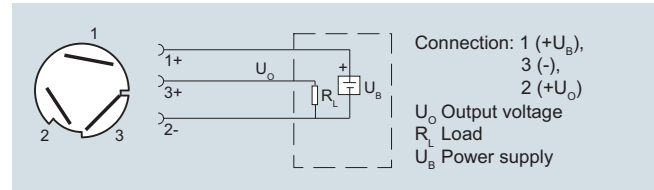
Connection with current output and cable



Connection with voltage output and cable



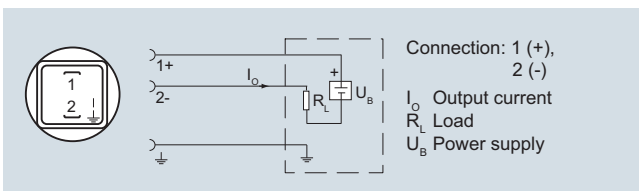
Connection with current output and Quickon cable quick screw connection



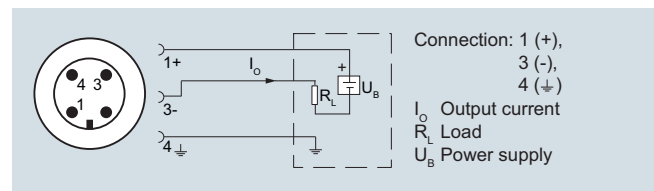
Connection with voltage output and Quickon cable quick screw connection

Version with explosion protection: 4 ... 20 mA

The grounding connection is conductively bonded to the transmitter enclosure



Connection with current output and connector per EN 175301 (Ex)



Connection with current output and connector M12x1 (Ex)

Overview



The pressure transmitter SITRANS P210 measures the gauge pressure of liquids, gases and vapors.

- Stainless steel measuring cell
- Measuring ranges 100 to 600 mbar (1.45 to 8.7 psi) relative
- For low-pressure applications

Benefits

- High measuring accuracy
- Rugged stainless steel enclosure
- High overload withstand capability
- For aggressive and non-aggressive media
- For measuring the pressure of liquids, gases and vapors
- Compact design

Application

The pressure transmitter SITRANS P210 for gauge pressure is used in the following industrial areas:

- Mechanical engineering
- Shipbuilding
- Power engineering
- Chemical industry
- Water supply

Design

Device structure without explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65), a round plug M12 (IP67), a cable (IP67) or a Quickon cable quick screw connection (IP67) connected electrically. The output signal is between 4 and 20 mA or 0 and 10 V.

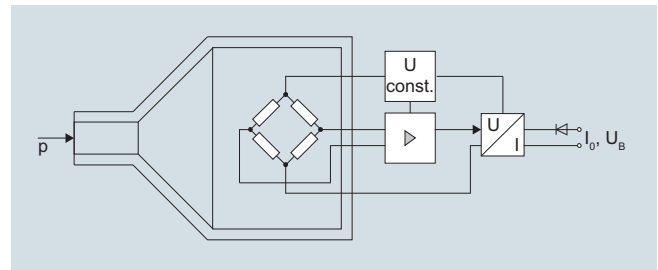
Device structure with explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65) or a round plug M12 (IP67) connected electrically. The output signal is between 4 and 20 mA.

Function

The pressure transmitter measures the gauge pressure of liquids and gases as well as the level of liquids.

Mode of operation



SITRANS P210 pressure transmitters (7MF1566-...), functional diagram

The stainless steel measuring cell has a thin-film resistance bridge to which the operating pressure p is transmitted through a stainless steel diaphragm.

The voltage output from the measuring cell is converted by an amplifier into an output current of 4 to 20 mA or an output voltage of 0 to 10 V DC.

The output current and voltage are linearly proportional to the input pressure.

Pressure Measurement

Transmitters for basic requirements

SITRANS P210 for gauge pressure

Technical specifications

Application	Liquids, gases and vapors
Mode of operation	
Measuring principle	Piezoresistive measuring cell (stainless steel diaphragm)
Measured variable	Gauge pressure
Inputs	
Measuring range	
• Gauge pressure	100 ... 600 mbar (1.5 ... 8.7 psi)
Output	
Current signal	4 ... 20 mA
• Load	$(U_B - 10 \text{ V})/0.02 \text{ A}$
• Auxiliary power U_B	DC 7 ... 33 V (10 ... 30 V for Ex)
Voltage signal	0 ... 10 V DC
• Load	$\geq 10 \text{ k}\Omega$
• Auxiliary power U_B	12 ... 33 V DC
• Power consumption	$< 7 \text{ mA}$ at 10 k Ω
Characteristic curve	Linear rising
Measuring accuracy	
Error in measurement at limit setting incl. hysteresis and reproducibility	<ul style="list-style-type: none"> • Typical: 0.25 % of full-scale value • Maximum: 0.5 % of full-scale value
Step response time T_{99}	$< 5 \text{ ms}$
Long-term stability	
• Lower range value and measuring span	0.25 % of full-scale value/year
Influence of ambient temperature	
• Lower range value and measuring span	<ul style="list-style-type: none"> • 0.25 %/10 K of full-scale value • 0.5 %/10K of full-scale value for a measuring range 100 ... 400 mbar
• Influence of power supply	0.005 %/V
Conditions of use	
Process temperature with gasket made of:	
• FPM (Standard)	-15 ... +125 °C (+5 ... +257 °F)
• Neoprene	-35 ... +100 °C (-31 ... +212 °F)
• Perbunan	-20 ... +100 °C (-4 ... +212 °F)
• EPDM	-40 ... +145 °C (-40 ... +293 °F), usable for drinking water
Ambient temperature	-25 ... +85 °C (-13 ... +185 °F)
Storage temperature	-50 ... +100 °C (-58 ... +212 °F)
Degree of protection (to EN 60529)	<ul style="list-style-type: none"> • IP 65 with connector per EN 175301-803-A • IP 67 with M12 connector • IP 67 with cable • IP 67 with cable quick screw connection
Electromagnetic compatibility	<ul style="list-style-type: none"> • acc. IEC 61326-1/-2/-3 • acc. NAMUR NE21, only for ATEX versions and with a max. measuring deviation $\leq 1 \%$
Mounting position	upright

Design	
Weight	Approx. 0.090 kg (0.198 lb)
Process connections	See dimension drawings
Electrical connections	<ul style="list-style-type: none"> • Connector per EN 175301-803-A Form A with cable inlet M16x1.5 or 1/2-14 NPT or Pg 11 • M12 connector • 2 or 3-wire (0.5 mm²) cable ($\varnothing \pm 5.4 \text{ mm}$) • Quickon cable quick screw connection
Wetted parts materials	
• Measuring cell	Stainless steel, mat.-No. 1.4435
• Process connection	Stainless steel, mat. No. 1.4404 (SST 316 L)
• Gasket	<ul style="list-style-type: none"> • FPM (Standard) • Neoprene • Perbunan • EPDM
Non-wetted parts materials	
• Enclosure	Stainless steel, mat. No. 1.4404 (SST 316 L)
• Rack	Plastic
• cables	PVC
Certificates and approvals	
Classification according to pressure equipment directive (PED 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; meets requirements as per article 3, paragraph 3 (good engineering practice)
Lloyd's Register of Shipping (LR)	12/20010
Germanischer Lloyd (GL)	GL19740 11 HH00
American Bureau of Shipping (ABS)	ABS_11_HG 789392_PDA
Bureau Veritas (BV)	BV 271007A0 BV
Det Norske Veritas (DNV)	A 12553
Drinking water approval (ACS)	ACS 11 ACC NY 055
GOST	GOST-R
Underwriters Laboratories (UL)	
• for USA and Canada	UL 20110217 - E34453
• worldwide	IEC UL DK 21845
Explosion protection	
Intrinsic safety "i" (only with current output)	Ex II 1/2 G Ex ia IIC T4 Ga/Gb Ex II 1/2 D Ex ia IIIC T125 °C Da/Db
EC type-examination certificate	SEV 10 ATEX 0146
Connection to certified intrinsically-safe resistive circuits with maximum values:	$U_i \leq 30 \text{ V DC}$; $I_i \leq 100 \text{ mA}$; $P_i \leq 0.75 \text{ W}$
Effective internal inductance and capacity for versions with plugs per EN 175301-803-A and M12	$L_i = 0 \text{ nH}$; $C_i = 0 \text{ nF}$

Pressure Measurement

Transmitters for basic requirements

SITRANS P210 for gauge pressure

1

Selection and ordering data

SITRANS P 210 pressure transmitters for gauge pressure for low pressure applications

Accuracy typ. 0.25 %

Wetted parts materials: Stainless steel + sealing material

Non-wetted parts materials: stainless steel

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Measuring range		Overload limit		Burst pressure		Article No.	Order code
		min.	max.				
For gauge pressure							
0...100 mbar (1.45 psi)		-400 mbar (-5.8 psi)	400 mbar (5.8 psi)	1 bar (14.5 psi)	▶◆	7MF1566-3AA	
0...160 mbar (2.32 psi)		-400 mbar (-5.8 psi)	400 mbar (5.8 psi)	1 bar (14.5 psi)	▶◆	7MF1566-3AB	
0...250 mbar (3.63 psi)		-800 mbar (-11.6 psi)	1000 mbar (14.5 psi)	2 bar (29.0 psi)	▶◆	7MF1566-3AC	
0...400 mbar (5.8 psi)		-800 mbar (-11.6 psi)	1000 mbar (14.5 psi)	2 bar (29.0 psi)	▶◆	7MF1566-3AD	
0...600 mbar (8.7 psi)		-1000 mbar (-14.5 psi)	2000 mbar (29.0 psi)	3 bar (43.5 psi)	▶◆	7MF1566-3AG	
Other version, add Order code and plain text: Measuring range: ... up to ... mbar (psi)						7MF1566-9AA	H1Y
Output signal							
4 ... 20 mA; two-wire system; power supply 7 ... 33 V DC (10 ... 30 V DC for ATEX versions)						▶◆	0
0 ... 10 V; three-wire system; power supply 12 ... 33 V DC						▶◆	10
Explosion protection (only 4 ... 20 mA)							
None						▶◆	0
With explosion protection Ex ia IIC T4						▶◆	1
Electrical connection							
Connector per DIN EN 175301-803-A, stuffing box thread M16 (with coupling)						▶◆	1
Connection via fixed mounted cable, 2 m (not for type of protection "Intrinsic safety i")						▶◆	03
Quickon cable quick screw connection PG9 (not for type of protection "Intrinsic safety i")						▶◆	04
Connector per DIN EN 175301-803-A, stuffing box thread 1/2"-14 NPT (with coupling)						▶◆	5
Connector per DIN EN 175301-803-A, stuffing box thread PG11 (with coupling)						▶◆	6
Fixed mounted cable, length 5 m						▶◆	07
Special version						▶◆	9
Process connection							
G½" male per EN 837-1 (½" BSP male) (standard for metric pressure ranges mbar, bar)						▶◆	A
G½" male thread and G1/8" female thread						▶◆	B
G¼" male per EN 837-1 (¼" BSP male)						▶◆	C
7/16"-20 UNF male						▶◆	D
¼"-18 NPT male (standard for pressure ranges inH ₂ O and psi)						▶◆	E
¼"-18 NPT female						▶◆	F
½"-14 NPT male						▶◆	G
½"-14 NPT female						▶◆	H
7/16"-20 UNF female						▶◆	J
M20x1.5 male						▶◆	P
Special version						▶◆	Z
Sealing material between sensor and enclosure							
Viton (FPM, standard)						▶◆	A
Neoprene (CR)						▶◆	B
Perbunan (NBR)						▶◆	C
EPDM						▶◆	D
Special version						▶◆	Z
Version							
Standard version						▶◆	1
Further designs							
Supplement the Article No. with "-Z" and add Order code.							
Manufacturer's test certificate M per IEC 60770-2 (calibration certificate) supplied							
C11							

▶ Available ex stock

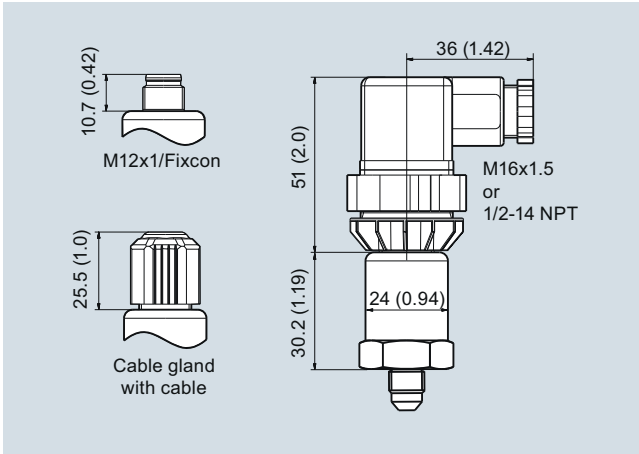
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Pressure Measurement

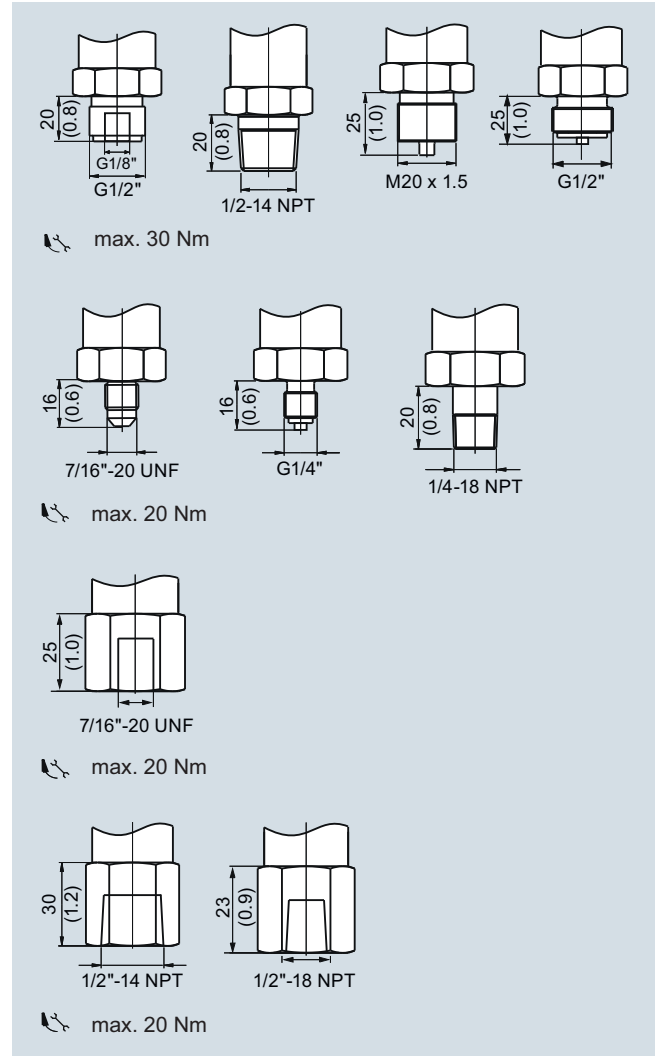
Transmitters for basic requirements

SITRANS P210 for gauge pressure

Dimensional drawings

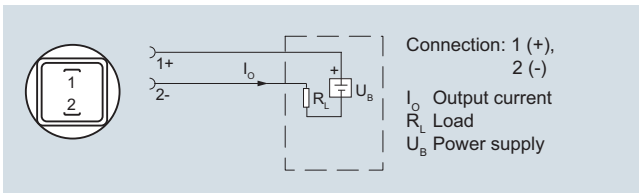


SITRANS P210, electrical connections, dimensions in mm (inch)

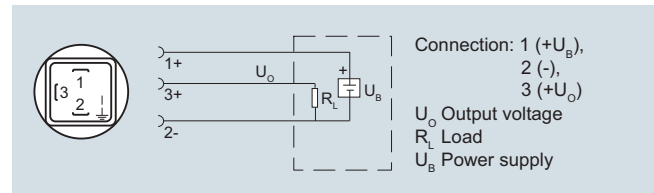


SITRANS P210, process connections, dimensions in mm (inch)

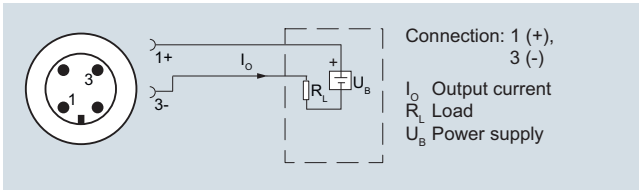
Schematics



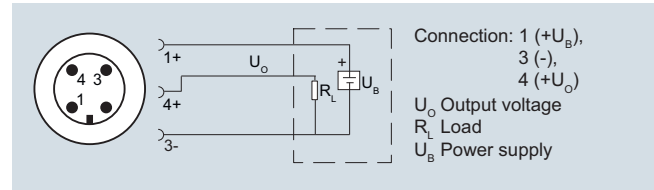
Connection with current output and connector per EN 175301



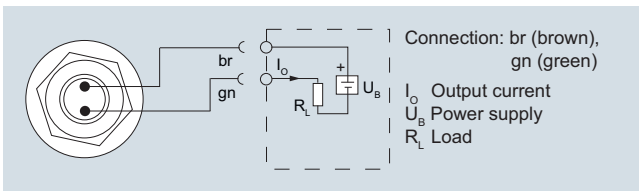
Connection with voltage output and connector per EN 175301



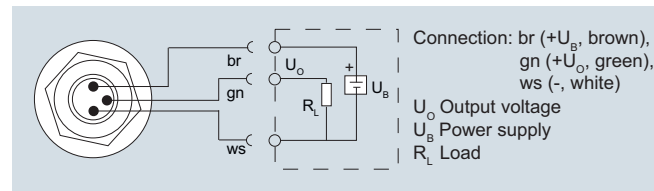
Connection with current output and connector M12x1



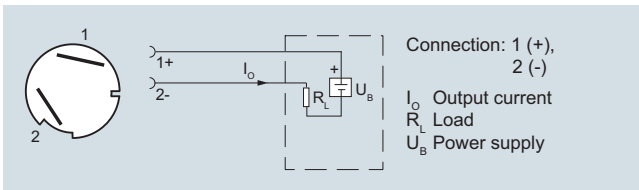
Connection with voltage output and connector M12x1



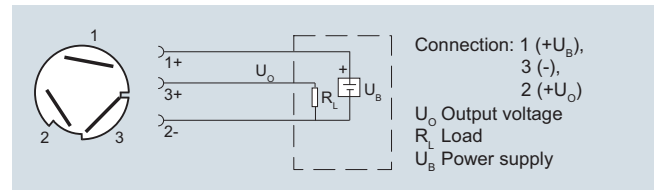
Connection with current output and cable



Connection with voltage output and cable



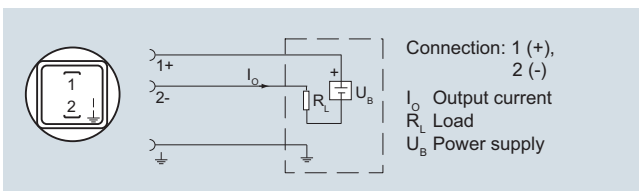
Connection with current output and Quickon cable quick screw connection



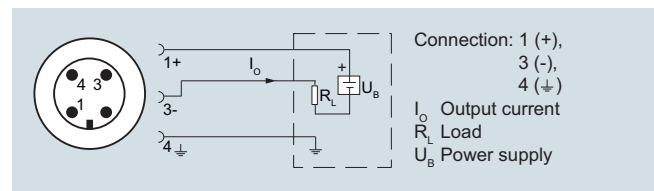
Connection with voltage output and Quickon cable quick screw connection

Version with explosion protection: 4 ... 20 mA

The grounding connection is conductively bonded to the transmitter enclosure



Connection with current output and connector per EN 175301 (Ex)



Connection with current output and connector M12x1 (Ex)

Pressure Measurement

Transmitters for basic requirements

SITRANS P220 for gauge pressure

Overview



The pressure transmitter SITRANS P220 measures the gauge pressure of liquids, gases and vapors.

- Stainless steel measuring cell, fully welded
- Measuring ranges 2.5 to 600 bar (36.3 to 8702 psi) relative
- For high-pressure applications and refrigeration technology division

Benefits

- High measuring accuracy
- Rugged stainless steel enclosure
- High overload withstand capability
- For aggressive and non-aggressive media
- For measuring the pressure of liquids, gases and vapors
- Compact design
- Gasket-less

Application

The pressure transmitter SITRANS P220 for gauge pressure is used in the following industrial areas:

- Mechanical engineering
- Shipbuilding
- Power engineering
- Chemical industry
- Water supply

Design

Device structure without explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65), a round plug M12 (IP67), a cable (IP67) or a Quickon cable quick screw connection (IP67) connected electrically. The output signal is between 4 and 20 mA or 0 and 10 V.

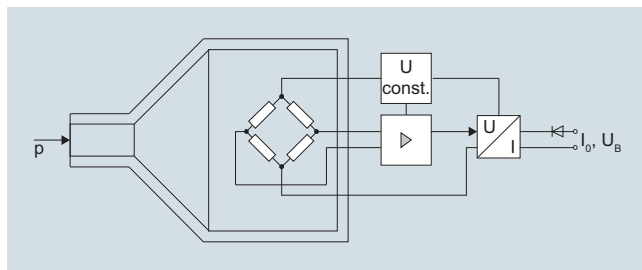
Device structure with explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65) or a round plug M12 (IP67) connected electrically. The output signal is between 4 and 20 mA.

Function

The pressure transmitter measures the gauge pressure of liquids and gases as well as the level of liquids.

Mode of operation



SITRANS P220 pressure transmitters (7MF1567-...), functional diagram

The stainless steel measuring cell has a thick-film resistance bridge to which the operating pressure p is transmitted through a stainless steel diaphragm.

The voltage output from the measuring cell is converted by an amplifier into an output current of 4 to 20 mA or an output voltage of 0 to 10 V DC.

The output current and voltage are linearly proportional to the input pressure.

Technical specifications

Application	Gauge pressure measurement	Liquids, gases and vapors
Mode of operation	Measuring principle	Piezoresistive measuring cell (stainless steel diaphragm)
Measured variable		Gauge pressure
Inputs	Measuring range	
• Gauge pressure		
- Metric		2.5 ... 600 bar (36 ... 8700 psi)
- US measuring range		30... 8700 psi
Output	Current signal	4 ... 20 mA
• Load		($U_B - 10 \text{ V}$)/0.02 A
• Auxiliary power U_B		DC 7 ... 33 V (10 ... 30 V for Ex)
Voltage signal		0 ... 10 V DC
• Load		$\geq 10 \text{ k}\Omega$
• Auxiliary power U_B		12 ... 33 V DC
• Power consumption		< 7 mA at 10 k Ω
Characteristic curve		Linear rising
Measuring accuracy	Error in measurement at limit setting incl. hysteresis and reproducibility	<ul style="list-style-type: none"> • Typical: 0.25 % of full-scale value • Maximum: 0.5 % of full-scale value
Step response time T_{99}		< 5 ms
Long-term stability		
• Lower range value and measuring span		0.25 % of full-scale value/year
Influence of ambient temperature		
• Lower range value and measuring span		0.25 %/10 K of full-scale value
• Influence of power supply		0.005 %/V
Conditions of use	• Process temperature	-30 ... +120 °C (-22 ... +248 °F)
• Ambient temperature		-25 ... +85 °C (-13 ... +185 °F)
• Storage temperature		-50 ... +100 °C (-58 ... +212 °F)
• Degree of protection (to EN 60529)		<ul style="list-style-type: none"> • IP 65 with connector per EN 175301-803-A • IP 67 with M12 connector • IP 67 with cable • IP 67 with cable quick screw connection
Electromagnetic compatibility		<ul style="list-style-type: none"> • acc. IEC 61326-1/-2/-3 • acc. NAMUR NE21, only for ATEX versions and with a max. measuring deviation $\leq 1 \%$

Design	Weight	Approx. 0.090 kg (0.198 lb)
Process connections		See dimension drawings
Electrical connections		<ul style="list-style-type: none"> • Connector per EN 175301-803-A Form A with cable inlet M16x1.5 or ½-14 NPT or Pg 11 • M12 connector • 2 or 3-wire (0.5 mm²) cable ($\varnothing \pm 5.4 \text{ mm}$) • Quickon cable quick screw connection
Wetted parts materials		
• Measuring cell		Stainless steel, mat.-No. 1.4016
• Process connection		Stainless steel, mat. No. 1.4404 (SST 316 L)
Non-wetted parts materials		
• Enclosure		Stainless steel, mat. No. 1.4404 (SST 316 L)
• Rack		Plastic
• cables		PVC
Certificates and approvals	Classification according to pressure equipment directive (PED 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
Lloyd's Register of Shipping (LR)		12/20010
Germanischer Lloyd (GL)		GL19740 11 HH00
American Bureau of Shipping (ABS)		ABS_11_HG 789392_PDA
Bureau Veritas (BV)		BV 271007A0 BV
Det Norske Veritas (DNV)		A 12553
Drinking water approval (ACS)		ACS 11 ACC NY 055
GOST		GOST-R
Underwriters Laboratories (UL)		
• for USA and Canada		UL 20110217 - E34453
• worldwide		IEC UL DK 21845
Explosion protection	Intrinsic safety "i" (only with current output)	Ex II 1/2 G Ex ia IIC T4 Ga/Gb Ex II 1/2 D Ex ia IIIC T125 °C Da/Db
EC type-examination certificate		SEV 10 ATEX 0146
Connection to certified intrinsically-safe resistive circuits with maximum values:		$U_i \leq 30 \text{ V DC}$; $I_i \leq 100 \text{ mA}$; $P_i \leq 0.75 \text{ W}$
Effective internal inductance and capacity for versions with plugs per EN 175301-803-A and M12		$L_i = 0 \text{ nH}$; $C_i = 0 \text{ nF}$

Pressure Measurement

Transmitters for basic requirements

SITRANS P220 for gauge pressure

1

Selection and ordering data

SITRANS P 220 pressure transmitters for gauge pressure, high-pressure and refrigeration applications, fully-welded version

Accuracy typ. 0.25 %

Wetted parts materials: stainless steel

Non-wetted parts materials: stainless steel

[Click on the Article No. for the online configuration in the PIA Life Cycle Portal.](#)

Article No.

Order code

7MF1567 - - A

Measuring range

Overload limit

**Mini-
mum**
Max.

Burst pressure

For gauge pressure

0 ... 2.5 bar	(0 ... 36.3 psi)	-1 bar (-14.5 psi)	6.25 bar (90.7 psi)	25 bar (363 psi)	▶◆	3BD
0 ... 4 bar	(0 ... 58 psi)	-1 bar (-14.5 psi)	10 bar (145 psi)	40 bar (870 psi)	▶◆	3BE
0 ... 6 bar	(0 ... 87 psi)	-1 bar (-14.5 psi)	15 bar (217 psi)	60 bar (522 psi)	▶◆	3BG
0 ... 10 bar	(0 ... 145 psi)	-1 bar (-14.5 psi)	25 bar (362 psi)	60 bar (870 psi)	▶◆	3CA
0 ... 16 bar	(0 ... 232 psi)	-1 bar (-14.5 psi)	40 bar (580 psi)	96 bar (1392 psi)	▶◆	3CB
0 ... 25 bar	(0 ... 363 psi)	-1 bar (-14.5 psi)	62.5 bar (906 psi)	150 bar (2176 psi)	▶◆	3CD
0 ... 40 bar	(0 ... 580 psi)	-1 bar (-14.5 psi)	100 bar (1450 psi)	240 bar (3481 psi)	▶◆	3CE
0 ... 60 bar	(0 ... 870 psi)	-1 bar (-14.5 psi)	150 bar (2175 psi)	360 bar (5221 psi)	▶◆	3CG
0 ... 100 bar	(0 ... 1450 psi)	-1 bar (-14.5 psi)	250 bar (3625 psi)	600 bar (8702 psi)	▶◆	3DA
0 ... 160 bar	(0 ... 2320 psi)	-1 bar (-14.5 psi)	400 bar (5801 psi)	960 bar (13924 psi)	▶◆	3DB
0 ... 250 bar	(0 ... 3625 psi)	-1 bar (-14.5 psi)	625 bar (9064 psi)	1500 bar (21756 psi)	▶◆	3DD
0 ... 400 bar	(0 ... 5801 psi)	-1 bar (-14.5 psi)	1000 bar (14503 psi)	2400 bar (34809 psi)	▶◆	3DE
0 ... 600 bar	(0 ... 8702 psi)	-1 bar (-14.5 psi)	1500 bar (21755 psi)	2500 bar (36260 psi)	▶◆	3DG

Other version, add Order code and plain text:

Measuring range: ... up to... bar (psi)

Measuring ranges for gauge pressure (only for US market)

(0 ... 30 psi)	(-14.5 psi)	(75 psi)	(360 psi)	4BE
(0 ... 60 psi)	(-14.5 psi)	(150 psi)	(580 psi)	4BF
(0 ... 100 psi)	(-14.5 psi)	(250 psi)	(580 psi)	4BG
(0 ... 150 psi)	(-14.5 psi)	(375 psi)	(870 psi)	4CA
(0 ... 200 psi)	(-14.5 psi)	(500 psi)	(1390 psi)	4CB
(0 ... 300 psi)	(-14.5 psi)	(750 psi)	(2170 psi)	4CD
(0 ... 500 psi)	(-14.5 psi)	(1250 psi)	(3480 psi)	4CE
(0 ... 750 psi)	(-14.5 psi)	(1875 psi)	(5220 psi)	4CF
(0 ... 1000 psi)	(-14.5 psi)	(2500 psi)	(5220 psi)	4CG
(0 ... 1500 psi)	(-14.5 psi)	(3750 psi)	(8700 psi)	4DA
(0 ... 2000 psi)	(-14.5 psi)	(5000 psi)	(13920 psi)	4DB
(0 ... 3000 psi)	(-14.5 psi)	(7500 psi)	(21750 psi)	4DD
(0 ... 5000 psi)	(-14.5 psi)	(12500 psi)	(34800 psi)	4DE
(0 ... 6000 psi)	(-14.5 psi)	(15000 psi)	(34800 psi)	4DF
(0 ... 8700 psi)	(-14.5 psi)	(21000 psi)	(52200 psi)	4DG

Other version, add Order code and plain text: Measuring range: ... up to ... psi

Output signal

4 ... 20 mA; two-wire system; power supply 7 ... 33 V DC (10 ... 30 V DC for ATEX versions) ▶◆

0 ... 10 V; three-wire system; power supply 12 ... 33 V DC

Explosion protection (only 4 ... 20 mA)

None ▶◆

With explosion protection Ex ia IIC T4 ▶◆

Electrical connection

Connector per DIN EN 175301-803-A, stuffing box thread M16 (with coupling) ▶◆

Round connector M12 per IEC 61076-2-101 (not for gauge pressure ranges ≤ 16 bar)

Connection via fixed mounted cable, 2 m (not for type of protection "Intrinsic safety i")

Quickon cable quick screw connection PG9 (not for type of protection "Intrinsic safety i")

Connector per DIN EN 175301-803-A, stuffing box thread 1/2"-14 NPT (with coupling)

Connector per DIN EN 175301-803-A, stuffing box thread PG11 (with coupling)

Fixed mounted cable, length 5 m

Special version

▶ Available ex stock

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Pressure Measurement

Transmitters for basic requirements

SITRANS P220 for gauge pressure

1

Selection and ordering data	Article No.	Order code
SITRANS P 220 pressure transmitters for gauge pressure, high-pressure and refrigeration applications, fully-welded version Accuracy typ. 0.25 % Wetted parts materials: stainless steel Non-wetted parts materials: stainless steel	7MF1567 -	A
Process connection G½" male per EN 837-1 (½" BSP male) (standard for metric pressure ranges mbar, bar) ▶ G½" male thread and G1/8" female thread G¼" male per EN 837-1 (¼" BSP male) 7/16"-20 UNF male ¼"-18 NPT male (standard for pressure ranges inH ₂ O and psi) ¼"-18 NPT female (Only for measuring ranges ≤ 60 bar (870 psi)) ½"-14 NPT male ½"-14 NPT female (Only for measuring ranges ≤ 60 bar (870 psi)) 7/16"-20 UNF female M20x1.5 male Special version		A B C D E F G H J P Z P 1 Y
Version Standard version ▶		1
Further designs Supplement the Article No. with "-Z" and add Order code. Manufacturer's test certificate M per IEC 60770-2 (calibration certificate) supplied Oxygen application, oil and grease-free cleaning (Not in conjunction with explosion protection version)		C11 E10

▶ Available ex stock

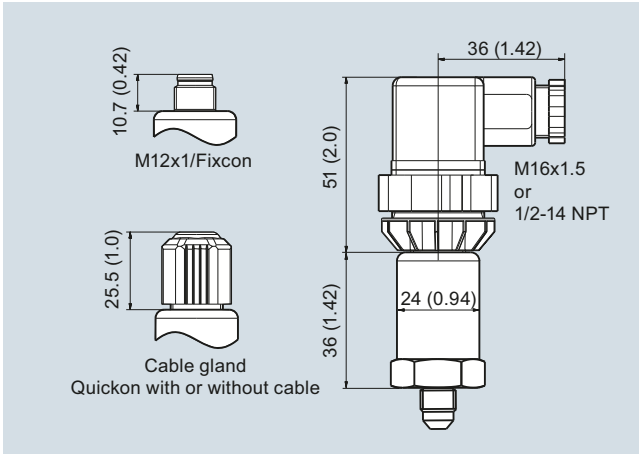
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Pressure Measurement

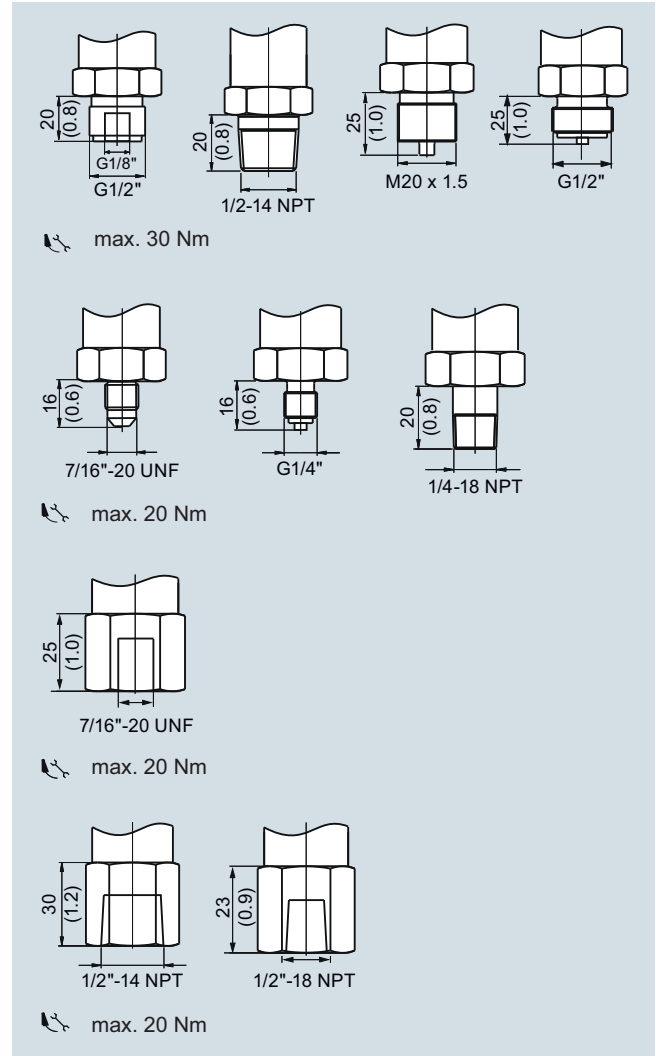
Transmitters for basic requirements

SITRANS P220 for gauge pressure

Dimensional drawings

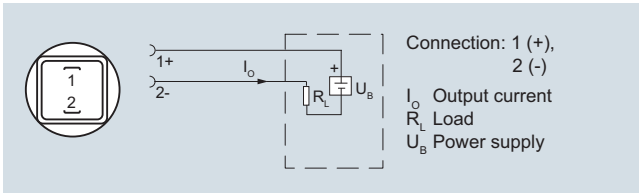


SITRANS P220, electrical connections, dimensions in mm (inch)

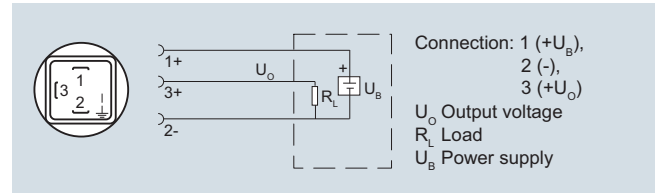


SITRANS P220, process connections, dimensions in mm (inch)

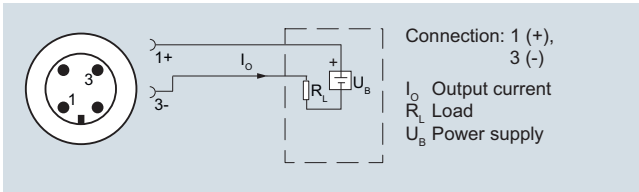
Schematics



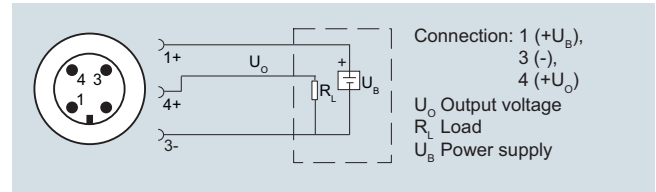
Connection with current output and connector per EN 175301



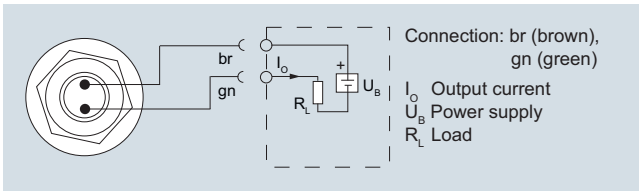
Connection with voltage output and connector per EN 175301



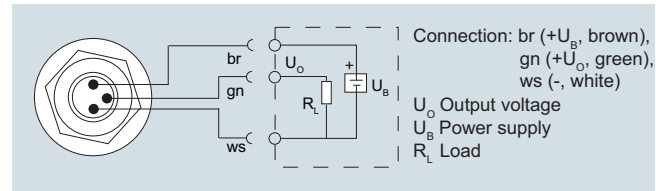
Connection with current output and connector M12x1



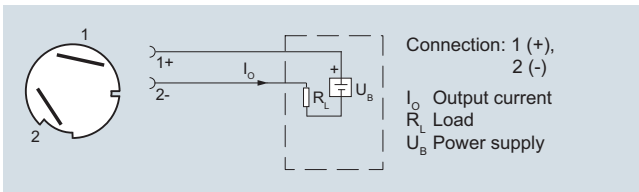
Connection with voltage output and connector M12x1



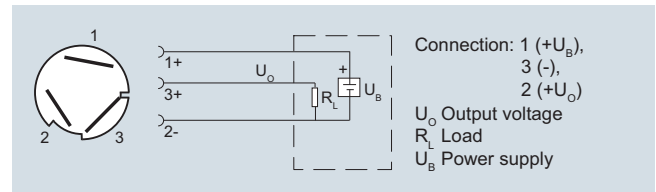
Connection with current output and cable



Connection with voltage output and cable



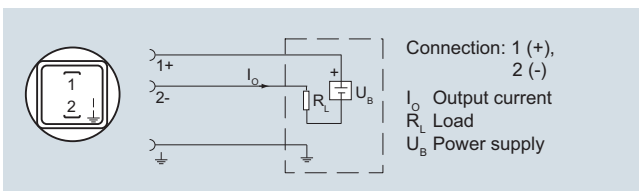
Connection with current output and cable quick screw connection Quickon



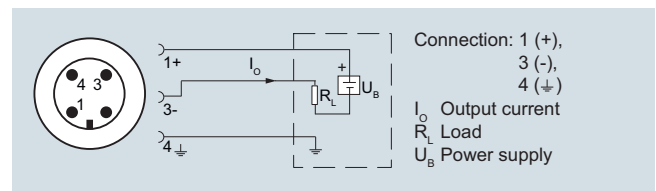
Connection with voltage output and cable quick screw connection Quickon

Version with explosion protection: 4 ... 20 mA

The grounding connection is conductively bonded to the transmitter enclosure



Connection with current output and connector per EN 175301 (Ex)



Connection with current output and connector M12x1 (Ex)

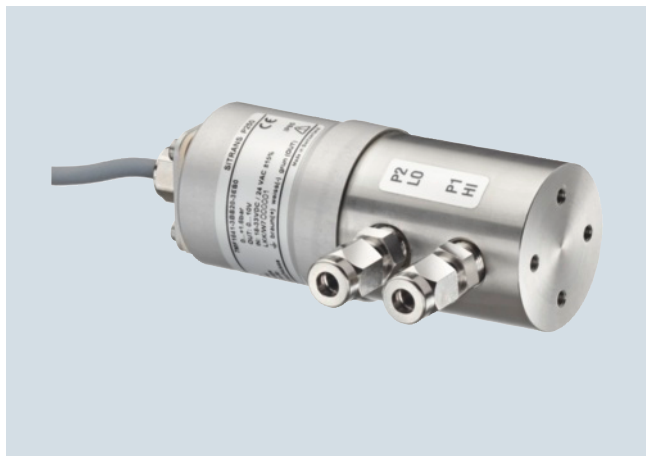
Pressure Measurement

Transmitters for basic requirements

SITRANS P250 for differential pressure

1

Overview



The SITRANS P250 transmitter measures the differential pressure of liquids and gases.

Benefits

- High measuring accuracy
- Sturdy stainless steel enclosure
- For aggressive and non-aggressive media
- For the measurement of the differential pressure of liquids and gases
- Temperature-compensated measuring cell
- Compact design

Application

The SITRANS P250 transmitter for differential pressure is primarily used in the following industries:

- Chemical industry
- Heating, ventilation and air conditioning technology
- Food industry
- Mechanical engineering
- Shipbuilding
- Water supply

Design

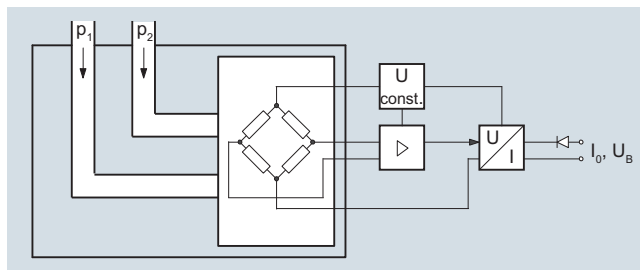
Main components:

- Stainless steel enclosure with piezo-resistive ceramic measuring cell (temperature-compensated) and electronics module
- Process connection made of stainless steel in diverse designs (see Selection and Ordering data)
- Electrical connection through connectors acc. to EN 175301-803-A and round connectors M12, as well as with permanently fixed cable

Function

The pressure transmitter measures the differential pressure of liquids and gases.

Mode of operation



SITRANS P250 pressure transmitter, function diagram

The piezo-resistive measuring cell (ceramic membrane) has a Wheatstone bridge circuit, on which the operating pressure P1 and P2 of the media acts at both ends.

The voltage output from the measuring cell is converted by an amplifier into an output current of 4 to 20 mA or an output voltage of 0 to 5 or 10 V DC.

The output current and voltage are linearly proportional to the input pressure.

Technical specifications

SITRANS P250 differential pressure transmitter	
Application	
Differential pressure transmitter	Liquids and neutral gases
Mode of operation	
Measuring principle	Piezo-resistive measuring cell (ceramic diaphragm)
Input	
Measured variable	Differential pressure
Measuring range	0 ... 0.1 to 0 ... 25 bar (0 ... 1.45 to 0 ... 363 psi)
Operating pressure	≤ 25 bar at a differential pressure range > 6 bar ≤ 50 bar at a differential pressure range > 10 bar
Burst pressure	1.5 x operating pressure
Output	
Output signal	
• Current output signal	4 ... 20 mA
• Voltage output signal	0 ... 5 V DC and 0 ... 10 V DC
Load	
• 3-wire	> 10 kΩ
• 2-wire	≤ (U _H - 11 V) / 0.02 A
Measuring accuracy	
Error in measurement at limit setting incl. hysteresis and reproducibility	≤ 1 % of typical full-scale value, see "Measuring range" table
Long-term stability acc. to IEC 60770	≤ 0.5 % of full-scale value/year
Influence of ambient temperature	
• Start of scale	≤ 0.6 % / 10 K of full-scale value (≤ 1.2 % / 10K for measuring cell 0 ... 0.1 bar (1.45 psi))
• Full-scale value	≤ 0.22 % / 10 K of full-scale value (≤ 0.37 % / 10K for measuring cell 0 ... 0.1 bar (1.45 psi))
Dynamic behavior	Suitable for static and dynamic measurements
Step response time T ₉₉	< 5 ms
Load variation	< 50 Hz

Pressure Measurement

Transmitters for basic requirements

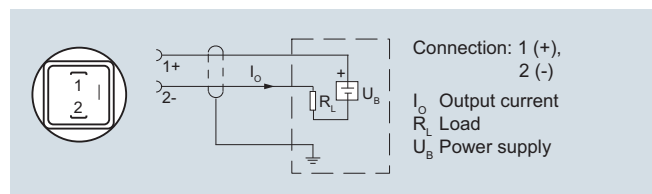
SITRANS P250 for differential pressure

1

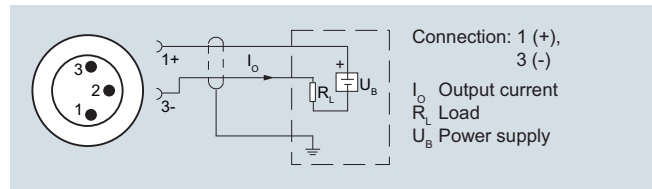
Rated conditions	
Ambient conditions	
• Temperature of medium	-15 ... +85 °C (5 ... 185 °F)
• Ambient temperature	-15 ... +85 °C (5 ... 185 °F)
• Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Degree of protection acc. to EN 60529	IP65
Mounting position	Any
Mounting	Mounting bracket, included in delivery
Design	
Weight	Approx. 430 g (approx. 0.95 lb)
Enclosure material	Stainless steel 1.4305/AISI 303
Electrical connection	<ul style="list-style-type: none"> • Plug EN 175301-803-A • Circular plug EN 60130-9 • Cable 1.5 m
Process connection	<ul style="list-style-type: none"> • Hose sleeve Ø 4 mm/6 mm • Pipe union Ø 6 mm/8 mm • Male thread 7/16-20 UNF, G1/8" • Female thread 1/8-27 NPT • (Standard), G1/8"
Wetted parts materials	
• Process connection	Stainless steel 1.4305/AISI 303, brass nickel-plated
• Diaphragm	Ceramic Al ₂ O ₃ (96 %)
• Sealing material	FPM (standard), EPDM, NBR, MVQ, CR
Power supply U _H	
Terminal voltage on pressure transmitter	
• 2-wire, 4 ... 20 mA	11 ... 33 V DC
• 3-wire, 0 ... 5 V DC	11 ... 33 V DC/24 V AC ±15 %
• 3-wire, 0 ... 10 V DC	18 ... 33 V DC/24 V AC ±15 %
Current consumption at nominal pressure	
• 2-wire	< 20 mA
• 3-wire	< 5 mA
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.
Certificates and approvals	
Approval	CE conformity

Measuring range		Max. perm. operating pressure (on either side)	Burst pressure	Max. perm. operating pressure (on one side)	Accuracy
[bar]	[inH ₂ O]				
0 ... 0.1	0 ... 40.18	25 bar (363 psi)	37.5 bar (544 psi)	0.6 bar (241 inH ₂ O)	≤ 1.0 %
0 ... 0.2	0 ... 80.37	25 bar (363 psi)	37.5 bar (544 psi)	0.6 bar (241 inH ₂ O)	≤ 0.8 %
0 ... 0.25	0 ... 100.46	25 bar (363 psi)	37.5 bar (544 psi)	0.6 bar (241 inH ₂ O)	≤ 0.5 %
0 ... 0.3	0 ... 120.56	25 bar (363 psi)	37.5 bar (544 psi)	0.6 bar (241 inH ₂ O)	≤ 0.5 %
0 ... 0.4	0 ... 160.74	25 bar (363 psi)	37.5 bar (544 psi)	1.2 bar (482 inH ₂ O)	≤ 0.8 %
0 ... 0.5	0 ... 200.9	25 bar (363 psi)	37.5 bar (544 psi)	1.2 bar (482 inH ₂ O)	≤ 0.5 %
0 ... 0.6	0 ... 241.0	25 bar (363 psi)	37.5 bar (544 psi)	1.2 bar (482 inH ₂ O)	≤ 0.5 %
0 ... 1.0	0 ... 402.0	25 bar (363 psi)	37.5 bar (544 psi)	2 bar (804 inH ₂ O)	≤ 0.5 %
0 ... 1.6	0 ... 643.0	25 bar (363 psi)	37.5 bar (544 psi)	3.2 bar (1286 inH ₂ O)	≤ 0.5 %
0 ... 2.5	0 ... 1005	25 bar (363 psi)	37.5 bar (544 psi)	5 bar (2009 inH ₂ O)	≤ 0.5 %
0 ... 4	0 ... 1607	25 bar (363 psi)	37.5 bar (544 psi)	8 bar (3215 inH ₂ O)	≤ 0.5 %
0 ... 6	0 ... 2411	25 bar (363 psi)	37.5 bar (544 psi)	12 bar (4822 inH ₂ O)	≤ 0.5 %
0 ... 10	0 ... 4019	50 bar (725 psi)	75 bar (1088 psi)	20 bar (8037 inH ₂ O)	≤ 0.5 %
0 ... 16	0 ... 6430	50 bar (725 psi)	75 bar (1088 psi)	32 bar (464 psi)	≤ 0.5 %
0 ... 25	0 ... 10046	50 bar (725 psi)	75 bar (1088 psi)	50 bar (725 psi)	≤ 0.5 %

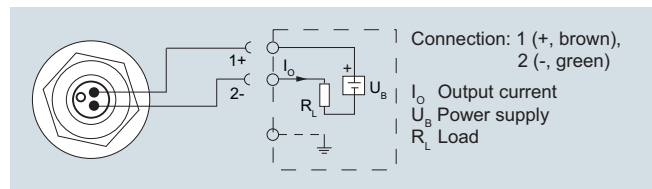
Schematics



Connection with current output 4 ... 20 mA and plug to EN 175301-803-A



Connection with current output 4 ... 20 mA and round connector



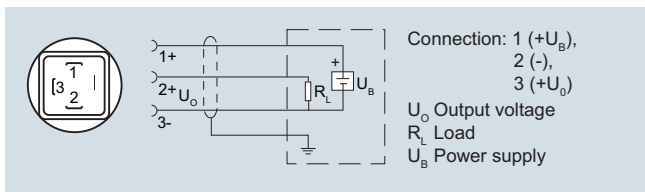
Connection with current output 4 ... 20 mA and permanently fixed cable

Pressure Measurement

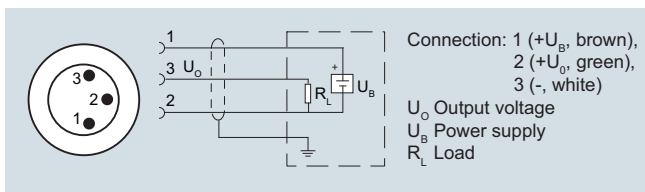
Transmitters for basic requirements

SITRANS P250 for differential pressure

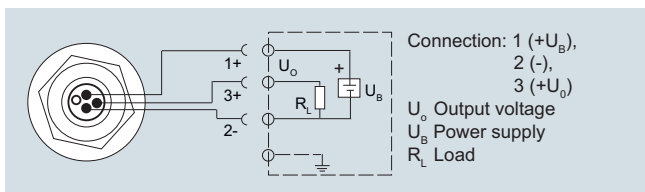
1



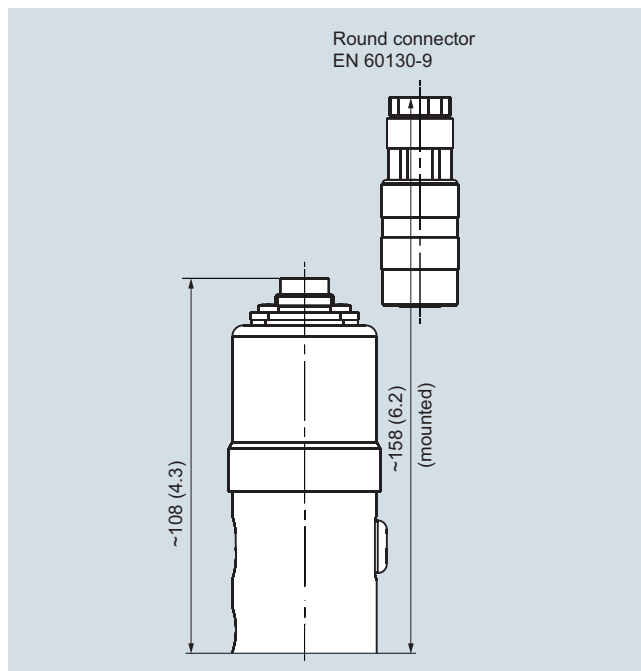
Connection with voltage output 0 ... 5 V DC (0 ... 10 V DC) and plug to EN 175301-803-A



Connection with voltage output 0 ... 5 V DC (0 ... 10 V DC) and round connector

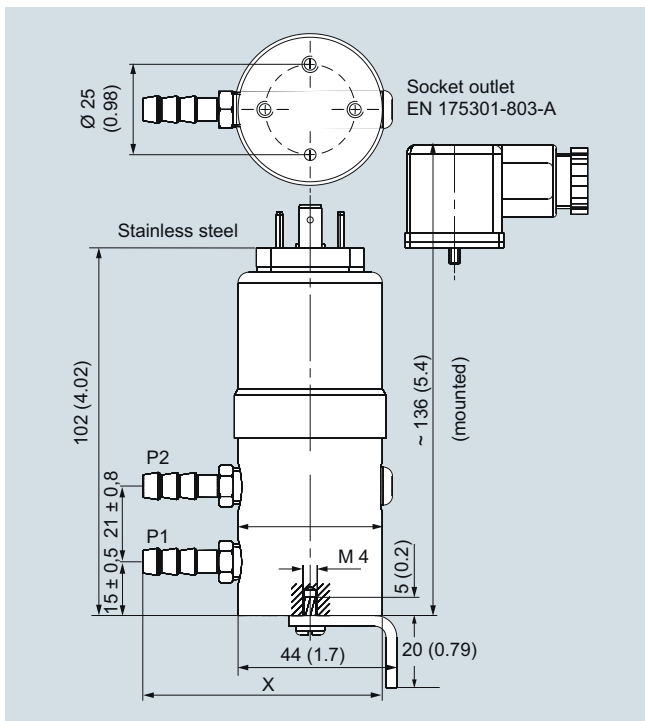


Connection with voltage output 0 ... 5 V DC (0 ... 10 V DC) and permanently fixed cable

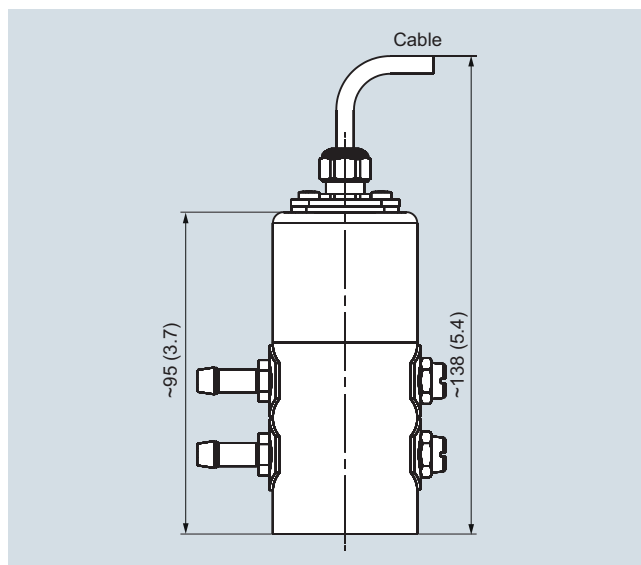


SITRANS P250 differential pressure transmitter with round connector to EN 60130-9, dimensions in mm (inch)

Dimensional drawings



SITRANS P250 differential pressure transmitter with socket outlet to EN 175301-803-A, dimensions in mm (inch)



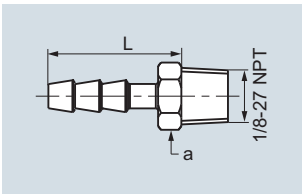
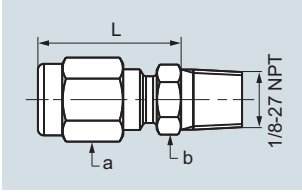
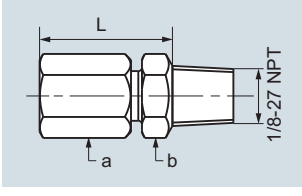
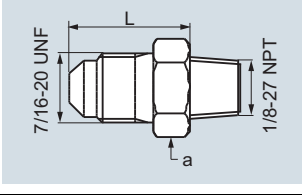
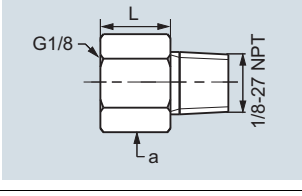
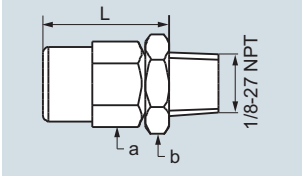
SITRANS P250 differential pressure transmitter with cable, dimensions in mm (inch)

Pressure Measurement

Transmitters for basic requirements

SITRANS P250 for differential pressure

1

Process connections	Ø		Width across flats	L		X	
	[mm]	[inch]		[mm]	[inch]	[mm]	[inch]
 <p>Hose connection for hose (brass nickel-plated)</p>	4	0.16	a = 10	20	0.79	61	2.40
	6	0.24	a = 10	25	0.99	66	2.60
 <p>Pipe union with screw-in nipple for outer pipe (brass nickel-plated)</p>	6	0.24	a = 10 b = 12	24	0.95	65	2.56
	8	0.32	a = 12 b = 14	25	0.99	66	2.60
 <p>Pipe union with screw-in nipple for outer pipe (stainless steel 1.4305/AISI 303)</p>	6	0.24	a = 10 b = 12	24	0.95	65	2.56
	8	0.32	a = 12 b = 14	26	1	67	2.64
 <p>Male thread 7/16-20 UNF (brass nickel-plated)</p>	-	-	a = 14	18	0.71	59	2.32
 <p>Female thread G1/8 (stainless steel 1.4305/AISI 303)</p>	-	-	a = 14	12	0.47	53	2
 <p>Male thread G1/8 (brass nickel-plated)</p>	-	-	a = 10 b = 12	20	0.79	61	2.40

Pressure Measurement

Transmitters for basic requirements

SITRANS P250 for differential pressure

Selection and Ordering data

SITRANS P 250 pressure transmitter for differential pressure

Accuracy ≤ 1 %, wetted parts ceramic/stainless steel 1.4301,
scope of delivery: transmitter, mounting bracket and instruction manual, without explosion protection

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Measuring range

0 ... 0.1 bar	(0 ... 40.19 inH ₂ O)	▶
0 ... 0.2 bar	(0 ... 80.37 inH ₂ O)	▶
0 ... 0.25 bar	(0 ... 100.46 inH ₂ O)	▶
0 ... 0.3 bar	(0 ... 120.56 inH ₂ O)	▶
0 ... 0.4 bar	(0 ... 160.74 inH ₂ O)	▶
0 ... 0.5 bar	(0 ... 201.0 inH ₂ O)	▶
0 ... 0.6 bar	(0 ... 241.0 inH ₂ O)	▶
0 ... 1.0 bar	(0 ... 402.0 inH ₂ O)	▶
0 ... 1.6 bar	(0 ... 643.0 inH ₂ O)	▶
0 ... 2.5 bar	(0 ... 1005.0 inH ₂ O)	▶
0 ... 4.0 bar	(0 ... 1607.0 inH ₂ O)	▶
0 ... 6.0 bar	(0 ... 2411.0 inH ₂ O)	▶
0 ... 10.0 bar	(0 ... 4019.0 inH ₂ O)	▶
0 ... 16.0 bar	(0 ... 6430.0 inH ₂ O)	▶
0 ... 25.0 bar	(0 ... 10046 inH ₂ O)	▶

Other version, add Order code and plain text (Note: smallest possible span 100 mbar (40.19 inH₂O))

Output signal

4 ... 20 mA	▶
0 ... 5 V DC	▶
0 ... 10 V DC	▶

Electrical connection

Plug acc. to EN 175 301-803-A (suitable coupling included in scope of delivery)	▶
Round connector acc. to EN 60139-9	▶
Cable 1.5 m with cable gland	▶

Process connection

Without connections, female thread 1/8-27 NPT

Hose connection

- Brass nickel-plated, for hose Ø 4 mm
- Brass nickel-plated, for hose Ø 6 mm

- PVDF, for hose Ø 6 mm

Pipe union

- Brass nickel-plated, for pipe Ø 6 mm
- Stainless steel 1.4304, for pipe Ø 6 mm
- Brass nickel-plated, for pipe Ø 8 mm
- Stainless steel 1.4304, for pipe Ø 8 mm

Male thread, 7/16-20 UNF (Brass nickel-plated)

Adapter

- Inner, G1/8 (stainless steel), for pipe Ø 6 mm
- Outer, G1/8 (Brass nickel-plated), with union nut, for pipe Ø 6 mm

Sealing material

Fluoro rubber (Viton/FPM)

Ethylene propylene diene monomer rubber (EPDM)

Nitrile butadiene rubber (NBR)

Silicone rubber (MVQ)

Neoprene (CR)

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Quality inspection certificate (factory calibration) to IEC 60770-2

▶ Available ex stock

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Article No.	Order code
7MF1641 - 0 - 0	
	3AA
	3AC
	3AD
	3AE
	3AF
	3AG
	3AH
	3BA
	3BB
	3BD
	3BE
	3BG
	3CA
	3CB
	3CD
	9AA
	H1Y
	0
	1
	2
	1
	2
	3
	A
	B
	C
	D
	E
	F
	G
	H
	L
	M
	N
	A
	B
	C
	D
	E
Order code	
C11	

Pressure Measurement

Transmitters for basic requirements

SITRANS LH100 Transmitter for hydrostatic level

1

Overview



The pressure transmitter SITRANS LH100 is a submersible sensor for hydrostatic level measurement.

The pressure transmitter measures the liquid levels in tanks, containers, channels and dams. The SITRANS LH100 pressure transmitters are available for various measuring ranges and with explosion protection as an option.

A junction box and a cable hanger are available as accessories for simple installation.

Benefits

- Compact design
- Simple installation
- Small error in measurement (0.3 %)
- Degree of protection IP68

Application

SITRANS LH100 pressure transmitters are used in the following branches, for example:

- Shipbuilding
- Water/waste water supply
- For use in unpressurized/open vessels and wells

Design

The pressure transmitter has a built-in ceramic sensor which is equipped with a Wheatstone resistance bridge.

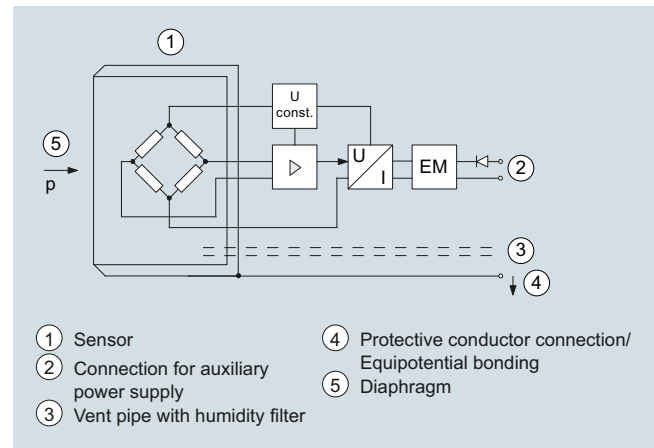
These pressure transmitters are equipped with an electronic circuit fitted together with the sensor in a stainless steel housing. In addition, the connecting cable contains a vent pipe which is equipped with a humidity filter to prevent the build-up of condensation.

The diaphragm is protected against external influences by a protective cap.

The sensor, the electronics and the connecting cable are housed in an enclosure with small dimensions.

The pressure transmitter is temperature-compensated for a wide temperature range.

Function



SITRANS LH100 pressure transmitter, mode of operation and connection diagram

On one side of the sensor (1), the diaphragm (5) is exposed to the hydrostatic pressure which is proportional to the submersion depth. This pressure is compared with atmospheric pressure. Pressure compensation is carried out using the vent pipe (3) in the connecting cable. The vent pipe is equipped with a humidity filter which prevents the build-up of condensation in the vent pipe.

The hydrostatic pressure of the liquid column acts on the diaphragm of the sensor and transmits the pressure to the Wheatstone resistance bridge in the sensor.

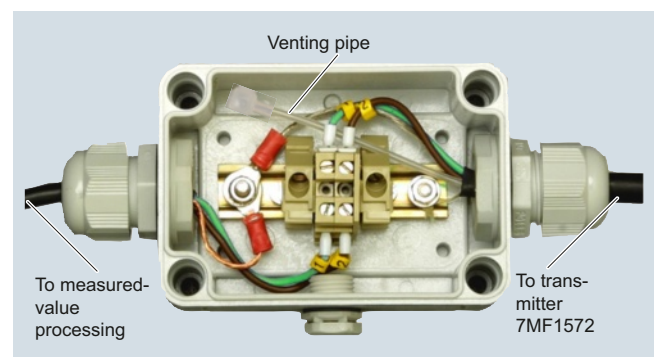
The output voltage of the sensor is applied to the electronic circuit where it is converted into an output current of 4 to 20 mA.

The protective conductor connection/equipotential bonding (4) is connected to the enclosure.

Integration

It is generally recommended that the connecting cable of the SITRANS LH100 transmitter is connected to the junction box, which can be ordered separately, and secured with the cable hanger, also available separately. The junction box has to be installed near the measuring point.

If the medium is anything other than water, it is also necessary to check compatibility with the specified materials of the transmitter.



Junction box 7MF1572-8AA, open, schematic diagram

Pressure Measurement

Transmitters for basic requirements

SITRANS LH100 Transmitter for hydrostatic level

1



Measuring point setup, generally with junction box 7MF1572-8AA and 7MF1572-8AB cable hanger

Long-term stability	
Zero and span	0.25% of full-scale value/year
• 4 ... 6 mH ₂ O (12 ... 18 ftH ₂ O or 0.4...0.6 bar)	
• > 6 mH ₂ O (> 18 ftH ₂ O or > 0.6 bar)	0.2 % of full-scale value/year
Rated conditions	
Ambient conditions	
• Process temperature	-10 ... +80 °C (14 ... 176 °F)
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)
Degree of protection according to IEC 60529	IP68
Design	
Weight	
• Pressure transmitter	≈ 0.2 kg (≈ 0.44 lb)
• Cable	0.025 kg/m (≈ 0.015 lb/ft)
Electrical connection	
Cable with 3 conductors, vent pipe and integrated humidity filter	
Material	
• Seal diaphragm	Al ₂ O ₃ ceramic, 96%
• Enclosure	Stainless steel, mat. no. 1.4404/316L
• Gasket	FPM (standard)
	EPDM (optional)
• Connecting cable	PE-HD (standard)
	PE-LD (in the case of versions with EPDM seal, suitable for drinking water)
Auxiliary power	
Terminal voltage on pressure transmitter U _B	10 ... 33 V DC
	10 ... 30 V DC for transmitter with intrinsic safety explosion protection

Technical specifications

Pressure transmitter SITRANS LH100 (submersible sensor)

Mode of operation	
Measuring principle	piezo-resistive
Input	
Measured variable	Hydrostatic level
Measuring range	Max. permissible operating pressure
• 0 ... 4 mH ₂ O (0 ... 12 ftH ₂ O)	• 1.5 bar (21.8 psi) (corresponds to 15 mH ₂ O (45 ftH ₂ O))
• 0 ... 5 mH ₂ O (0 ... 15 ftH ₂ O)	• 1.5 bar (21.8 psi) (corresponds to 15 mH ₂ O (45 ftH ₂ O))
• 0 ... 6 mH ₂ O (0 ... 18 ftH ₂ O)	• 1.5 bar (21.8 psi) (corresponds to 15 mH ₂ O (45 ftH ₂ O))
• 0 ... 10 mH ₂ O (0 ... 30 ftH ₂ O)	• 3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 20 mH ₂ O (0 ... 60 ftH ₂ O)	• 5.0 bar (72.5 psi) (corresponds to 50 mH ₂ O (150 ftH ₂ O))
• 0 ... 0.4 bar	• 1.5 bar
• 0 ... 0.5 bar	• 1.5 bar
• 0 ... 0.6 bar	• 1.5 bar
• 0 ... 1 bar	• 3.0 bar
• 0 ... 2 bar	• 5.0 bar
Output	
Output signal	4 ... 20 mA
Measuring accuracy	
Error in measurement at limit setting including hysteresis and reproducibility	According to IEC 60770-1 0.3% of full-scale value (typical)
Influence of ambient temperature	
Zero and span	
• 4 ... 6 mH ₂ O (12 ... 18 ftH ₂ O or 0.4...0.6 bar)	0.45 %/10 K of full-scale value
• > 6 mH ₂ O (> 18 ftH ₂ O or > 0.6 bar)	0.3 %/10 K of full-scale value

Certificates and approvals	
Drinking water approval (ACS)	1403525
Drinking water approval (WRAS)	applied for
GOST	applied for
Underwriters Laboratories (UL)	applied for
The transmitter is not subject to the pressure equipment directive (PED 97/23/EC)	
Explosion protection	
• Intrinsic safety "i"	IECEx SEV 14.0003 SEV 14 ATEX 0109 II 1 G Ex ia IIC T4 Ga
- Marking	

Junction box	
Application	for connecting the transmitter cable
Design	
Weight	0.2 kg (0.44 lb)
Electrical connection	2 x 3-way (28 to 18 AWG)
Cable entry	2 x Pg 9
Enclosure material	polycarbonate
Vent pipe for atmospheric pressure	
Screw for cable strength cord	
Rated conditions	
Degree of protection according to IEC 60529	IP65

Cable hanger	
Application	for mounting the transmitter
Design	
Weight	0.16 kg (0.35 lb)
Material	Galvanized steel, polyamide

Pressure Measurement

Transmitters for basic requirements

SITRANS LH100 Transmitter for hydrostatic level

1

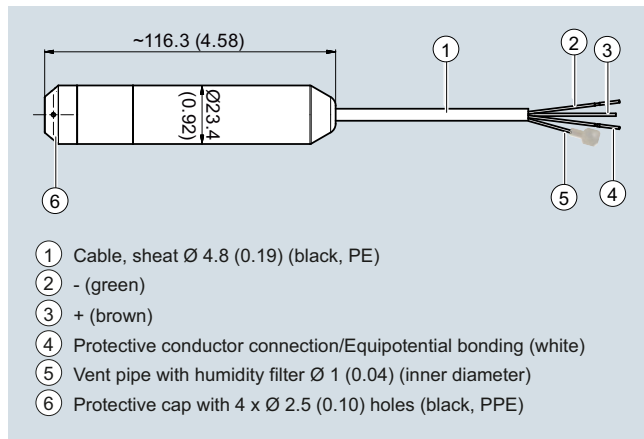
Selection and ordering data	Article No.	Order code	Additional versions	Order code
Pressure transmitter SITRANS LH100 (submersible sensor) For measurement of the hydrostatic level through submersion, two-wire system, 4...20 mA, enclosure material mat. no. 1.4404 (316L), measuring cell Al ₂ O ₃ ceramic, with permanently mounted PE cable ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7MF1572 -	A	Quality inspection certificate (factory calibration) acc. to IEC 60770-2, add " Z " to article no. and add order code. Indication of measuring range (only at special cable lengths) in "... to ... mH ₂ O" or "... to ... ftH ₂ O" or "... to ... bar"	C11 Y01
Measuring range Cable length 0 ... 4 mH ₂ O 10 m ▶ 0 ... 5 mH ₂ O 10 m ▶ 0 ... 6 mH ₂ O 10 m ▶ 0 ... 10 mH ₂ O 20 m ▶ 0 ... 20 mH ₂ O 30 m ▶ 0 ... 12 ftH ₂ O 33 ft 0 ... 15 ftH ₂ O 33 ft 0 ... 18 ftH ₂ O 33 ft 0 ... 30 ftH ₂ O 66 ft 0 ... 60 ftH ₂ O 98 ft 0 ... 0.4 bar 10 m 0 ... 0.5 bar 10 m 0 ... 0.6 bar 10 m 0 ... 1 bar 20 m 0 ... 2 bar 30 m		1 D 1 E 1 F 1 H 1 K 2 D 2 E 2 F 2 H 2 K 3 D 3 E 3 F 3 H 3 K	Accessories/spare parts Junction box ▶ for connecting the transmitter cable Cable hanger ▶ for securing the pressure transmitter Protective caps as spare parts (10-pack) ▶ Humidity filters as spare parts (10-pack) ▶ ▶ Available ex stock	Article No. 7MF1572-8AA 7MF1572-8AB 7MF1572-8AD 7MF1572-8AE
Special versions: Measuring ranges for special versions between 0 ... 4 mH ₂ O and 0 ... 30 mH ₂ O or 0 ... 12 ftH ₂ O and 0 ... 90 ftH ₂ O or 0 ... 0.4 bar and 0 ... 3 bar possible. Special cable length/Special measuring range Please add „Z" to Article No. and specify Order code and plain text. Note: Indication of measuring range Y01 is always necessary. For evaluation of the maximum possible cable length following data have to be regarded: Transmitter: $C_i = 0 \mu F, L_i = 0 \mu H$ Cable: $C_k = 0.19 nF$ per meter cable $L_k = 1.5 \mu H$ per meter cable The maximum permitted data of the transmitter's power supply have to be considered! 3 m (10 ft) 5 m (16 ft) 7 m (23 ft) 10 m (33 ft) 15 m (49 ft) 20 m (66 ft) 25 m (82 ft) 30 m (98 ft) 40 m (131 ft) 50 m (164 ft)	9 A	H . . + Y 0 1		
Sealing material between sensor and enclosure <ul style="list-style-type: none"> • FPM (Standard) ▶ • EPDM (for drinking water applications) 		1 2		
Explosion protection <ul style="list-style-type: none"> • without ▶ • With ATEX II1 G Ex ia IIC T4 Ga and IECEx Ex ia IIC T4 Ga ▶ 		0 1		
				H 1 A H 1 B H 1 C H 1 D H 1 E H 1 F H 1 G H 1 H H 1 J H 1 K

Pressure Measurement

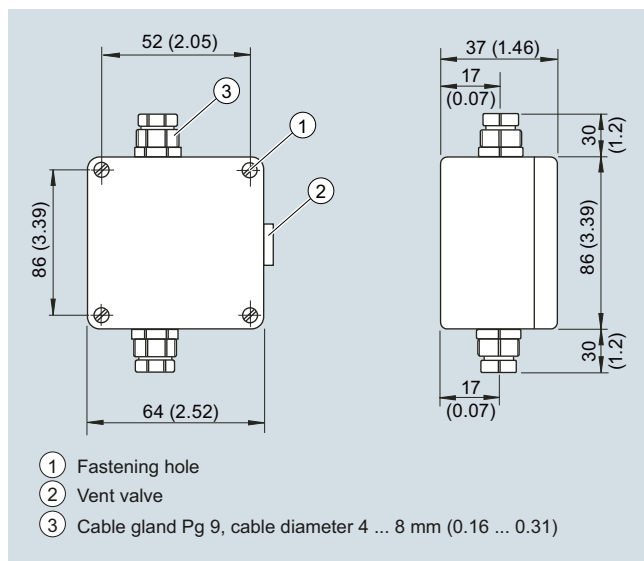
Transmitters for basic requirements

SITRANS LH100 Transmitter for hydrostatic level

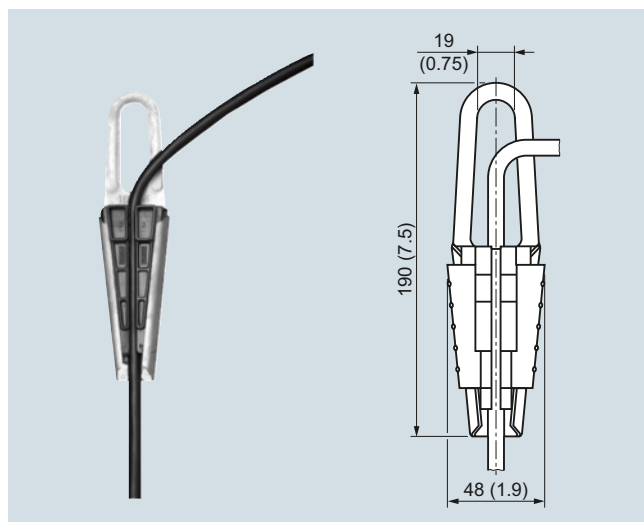
Dimensional drawings



SITRANS LH100 pressure transmitter, dimensions in mm (inch)



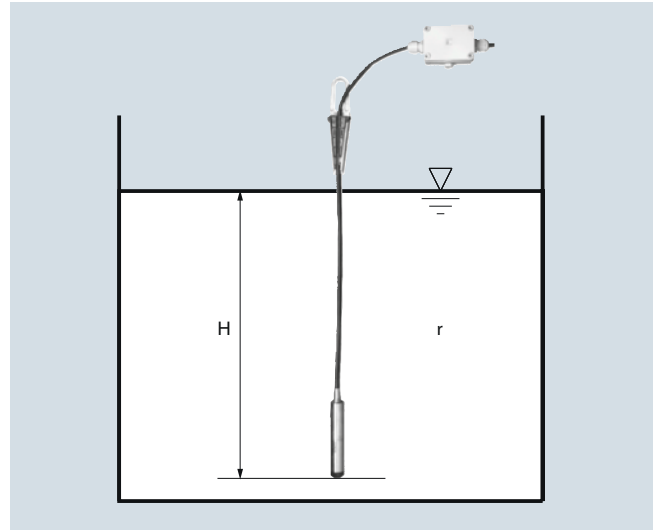
Junction box, dimensions in mm (inch)



Cable hanger, dimensions in mm (inch)

More information

Determination of the measuring range for media with a density of $\neq 1000 \text{ kg/m}^3$ (medium \neq water)



Calculation of the measuring range:

$$p = \rho \times g \times H$$

with:

ρ = density of medium

g = local acceleration due to gravity

H = maximum level

Example:

Medium: Diesel fuel, $\rho = 850 \text{ kg/m}^3$

Acceleration due to gravity: 9.81 m/s^2

Start-of-scale: 0 m

Maximum level: 6.0 m

Cable length: 10 m

Calculation:

$$p = 850 \text{ kg/m}^3 \times 9.81 \text{ m/s}^2 \times 6.0 \text{ m}$$

$$p = 50\,031 \text{ N/m}^2$$

$$p = 500 \text{ mbar}$$

Transmitter to be ordered:

7MF1572-1FA11

Plus, if required, junction box 7MF1572-8AA and cable hanger 7MF1572-8AB

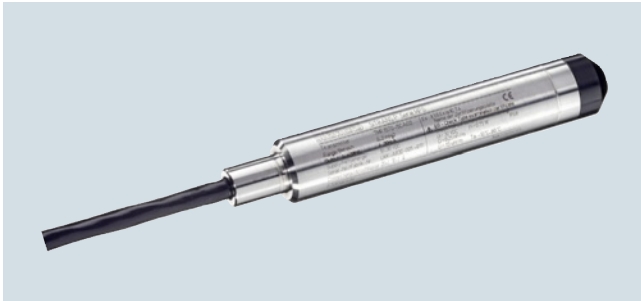
Pressure Measurement

Transmitters for basic requirements

SITRANS P MPS Transmitter for hydrostatic level

1

Overview



SITRANS P MPS pressure transmitters are submersible sensors for hydrostatic level measurements.

The SITRANS P MPS pressure transmitters are available for various measuring ranges and with explosion protection as an option.

A junction box and a cable hanger are available as accessories for simple installation.

Benefits

- Compact design
- Simple installation
- Small error in measurement (0.3 %)
- Degree of protection IP68

Application

SITRANS P MPS pressure transmitters are used in the following branches for example:

- Oil and gas industries
- Shipbuilding
- Water supply
- For use in pressureless/open tanks and wells

Design

SITRANS P MPS pressure transmitters have a front-flush piezo-resistive sensor with stainless steel diaphragm.

These pressure transmitters are equipped with an electronic circuit fitted together with the sensor in a stainless steel housing. The cable also contains a strength cord and vent pipe.

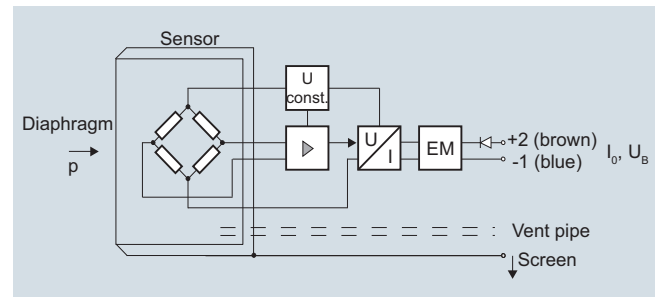
The diaphragm is protected against external influences by a protective cap.

The sensor, electronic circuit and cable are sealed in a common housing of small dimensions.

The pressure transmitter is temperature-compensated for a wide temperature range.

Function

SITRANS P MPS pressure transmitters are for measuring the liquid levels in wells, tanks, channels and dams.



SITRANS P MPS pressure transmitter, mode of operation and wiring diagram

On one side of the sensor, the diaphragm is exposed to the hydrostatic pressure which is proportional to the submersion depth. This pressure is compared with atmospheric pressure. Pressure compensation is carried out using the vent pipe in the connection cable.

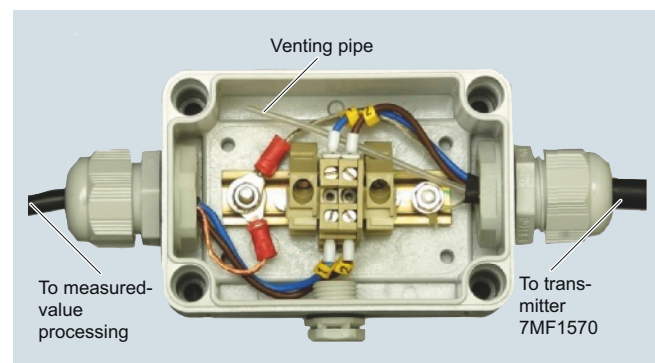
The hydrostatic pressure of the liquid column acts on the sensor diaphragm, and transmits the pressure to the piezo-resistive bridge in the sensor.

The output voltage of the sensor is applied to the electronic circuit where it is converted into an output current of 4 to 20 mA.

The cable of the 7MF1570 transmitter must always be connected in the supplied junction box. The junction box has to be installed near the measuring point.

If the medium is anything other than water, it is also necessary to check compatibility with the specified materials of the transmitter.

Integration



Junction box 7MF1570-8AA, opened

Pressure Measurement

Transmitters for basic requirements

SITRANS P MPS Transmitter for hydrostatic level

1



Measuring point setup, in principle

Technical specifications

SITRANS P MPS pressure measurement transmitter (submersible sensor)

Mode of operation

Measuring principle piezo-resistive

Input

Measured variable	Hydrostatic level
Measuring range	Maximum operating pressure
• 0 ... 2 mH ₂ O (0 ... 6 ftH ₂ O)	• 1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 4 mH ₂ O (0 ... 12 ftH ₂ O)	• 1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 5 mH ₂ O (0 ... 15 ftH ₂ O)	• 1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 6 mH ₂ O (0 ... 18 ftH ₂ O)	• 3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 10 mH ₂ O (0 ... 30 ftH ₂ O)	• 3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 20 mH ₂ O (0 ... 60 ftH ₂ O)	• 6.0 bar (87psi) (corresponds to 50 mH ₂ O (150 ftH ₂ O))

Output

Output signal 4 ... 20 mA

Measuring accuracy

Acc. to IEC 60770-1
Error in measurement at limit setting incl. hysteresis and reproducibility 0.3 % of full-scale value (typical)

Influence of ambient temperature

Zero and span

- 1 ... 6 mH₂O (3 ... 18 ftH₂O) 0.45 %/10 K of full-scale value
- ≥ 6 mH₂O (≥ 18 ftH₂O) 0.3 %/10 K of full-scale value

Long-term stability

Zero and span

- 1 ... 6 mH₂O (3 ... 18 ftH₂O) 0.25 % of full-scale value/year
- ≥ 6 mH₂O (≥ 18 ftH₂O) 0.2 % of full-scale value/year

Rated conditions

Ambient conditions

- Process temperature -10 ... +80 °C (14 ... 176 °F)
- Storage temperature -40 ... +100 °C (-40 ... +212 °F)

Degree of prot. to DIN EN 60529 IP68

Design

Weight

- Pressure transmitter ≈ 0.4 kg (≈ 0.88 lb)
- Cable 0.08 kg/m (≈ 0.054 lb/ft)

Electrical connection

Cable with 2 conductors with screen and vent pipe, strength cord (max. 300 N (67.44 lbf))

Material

- Seal diaphragm Stainl. steel, mat. no. 1.4571/316Ti
- Enclosure Stainl. steel, mat. no. 1.4571/316Ti
- Gasket Viton
- Connecting cable Either PE/HFFR sheath (non-halogen) or FEP sheath

Power supply

Terminal voltage on pressure transmitter U_B

10 ... 36 V DC
0 ... 30 V DC for transmitter with intrinsic safety explosion protection

Certificates and approvals

Germanischer Lloyd (GL)	GL 75360-09 HH
Bureau Veritas (BV)	BV 27101/A0 BV
Det Norske Veritas (DNV)	DNV A-12553
Drinking water approval (ACS)	ACS 11 ACC NY 014
Drinking water approval (WRAS)	WRAS 1111055
GOST	GOST-R, GOST FR.C.30.004.A/42376/1 und PPC 00-04 1505

The transmitter is not subject to the pressure equipment directive (PED 97/23/EC)

Explosion protection

- Intrinsic safety "i" SEV 10 ATEX 0149
- Marking II 1 G Ex ia IIC T4 Ga

Junction box

Application

for connecting the transmitter cable

Design

- Weight 0.2 kg (0.44 lb)
- Electrical connection 2 x 3-way (28 to 18 AWG)
- Cable entry 2 x M20 x 1.5
- Enclosure material polycarbonate

Vent pipe for atmospheric pressure

Screw for cable strength cord

Rated conditions

Degree of prot. to DIN EN 60529 IP65

Cable hanger

Application

for mounting the transmitter

Design

- Weight 0.16 kg (0.35 lb)
- Material Galvanized steel, polyamide

Pressure Measurement

Transmitters for basic requirements

SITRANS P MPS Transmitter for hydrostatic level

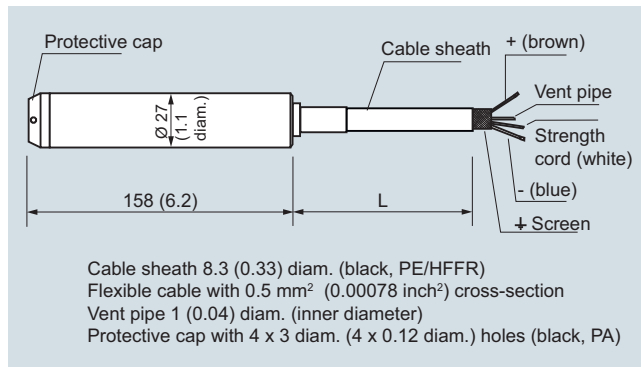
1

Selection and Ordering data	Article No.	Order code
SITRANS P MPS pressure transmitter for gauge pressure (submersible sensor)	7MF1570 -	A0
2-wire system		
Note: Junction box and cable hanger included in delivery		
Explosion protection		
• None		1
• with type of protection "intrinsic safety" (Ex II 1 G Ex ia IIC T4)		2
Approvals		
• with drinking water approval to WRAS and ACS (with EPDM gasket)		6
Further designs	Order code	
Quality inspection certificate (factory calibration) to IEC 60770-2, add "-Z" to Article No. and add Order code.	C11	
Indication of measuring range (only at special cable lengths) in ".... to ... mH ₂ O" or ".... to ... ftH ₂ O"	Y01	
Accessories (as spare part)	Article No.	
Junction box for connecting the transmitter cable	7MF1570-8AA	
Cable hanger for attachment of transmitter	7MF1570-8AB	

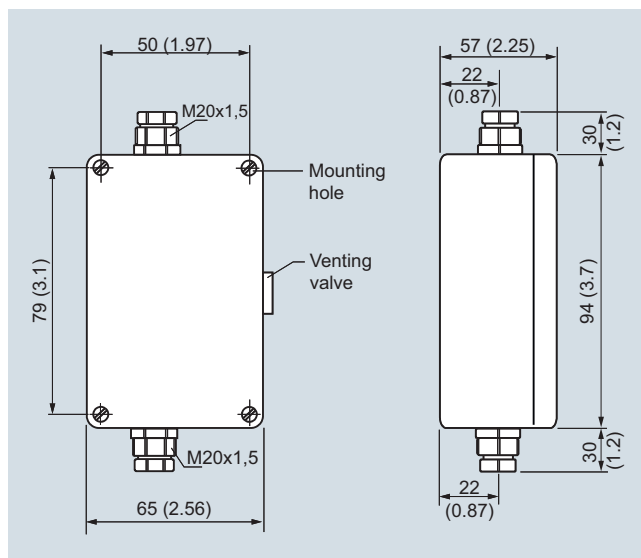
► Available ex stock
 ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.
 Power supply units see Chap. 7 "Supplementary Components".

1) Special measuring ranges of between 0 ... 1 mH₂O (0 ... 3 ftH₂O) and 0 ... 200 mH₂O (0 ... 656 ftH₂O) and special cable lengths of up to 1000 m (3281 ft) are possible.
 For evaluation of the maximum possible cable length following data have to be regarded:
 Transmitter: C_i = 0 µF, L_i = 0 µH
 Cable: C_k = 0.19 nF per meter cable, L_k = 1.5 µH per meter cable
 The maximum permitted data of the transmitter's power supply have to be considered!
 The length of free hanging cable should not exceed 375 m (1230 ft).
Note: Due to mounting reasons it has to be considered that the cable always must be longer than the height of the liquid column to be measured.

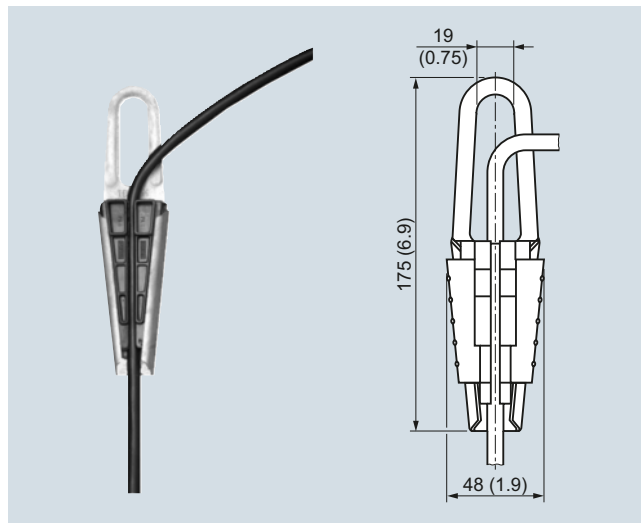
Dimensional drawings



SITRANS P MPS pressure transmitters, dimensions in mm (inch)



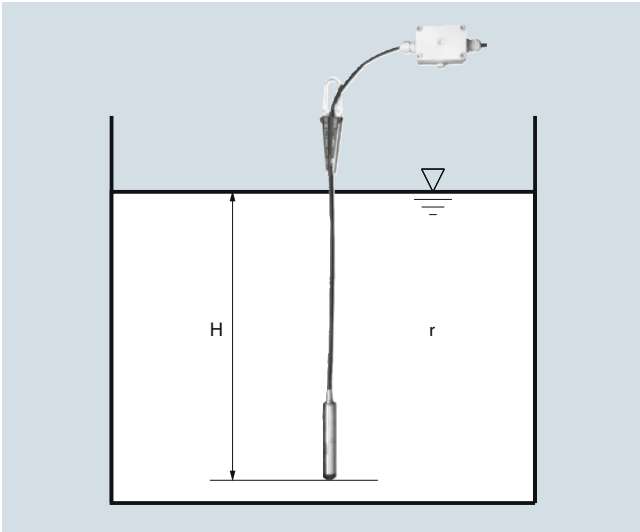
Junction box, dimensions in mm (inch)



Cable hanger, dimensions in mm (inch)

More information

Determination of the measuring range in case of media with a density $\neq 1000 \text{ kg/m}^3$ (medium \neq water)



Calculation of the measuring range:

$$p = \rho \times g \times H$$

with:

ρ = density of medium

g = local acceleration due to gravity

H = maximum level

Example:

Medium: Diesel fuel, $\rho = 850 \text{ kg/m}^3$

Acceleration due to gravity: 9.81 m/s^2

Start-of-scale: 0 m

Maximum level: 6.2 m

Cable length: 7 m, FEP cable

Calculation:

$$p = 850 \text{ kg/m}^3 \times 9.81 \text{ m/s}^2 \times 6.2 \text{ m}$$

$$p = 51698.7 \text{ N/m}^2$$

$$p = 517 \text{ mbar}$$

Transmitter to be ordered:

7MF1570-9AA02-Z, H5C + Y01

Y01: 0 ... 517 mbar

Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

Overview



The SITRANS P Compact pressure transmitter is designed for the special requirements of the food, pharmaceutical and biotechnology industries.

The use of high-grade materials guarantees compliance with hygiene regulations.

Particular value has been placed on a high surface quality. The system can be electropolished in addition.

A further important feature is the hygiene-based design of the process connection by means of various aseptic connections.

The completely welded stainless steel housing can be designed up to degree of protection IP67.

Using appropriate thermal decouplers, the SITRANS P Compact pressure transmitter can be used for process temperatures up to 200 °C (392 °F).

Benefits

- Measuring ranges from 0 to 160 mbar (0 to 2.32 psi) to 0 to 40 bar (0 to 580 psi)
- Linearity error including hysteresis < +0.2 % of full-scale value
- Piezo-resistive measurement system, vacuum-proof and overload-proof
- Hygiene-based design according to EHEDG, FDA and GMP recommendations
- Material and surface quality according to hygiene requirements
- Wetted parts made of stainless steel; completely welded
- Signal output 4 to 20 mA (0 to 20 mA as option)
- Stainless steel housing with degree of protection IP65 (IP67 as option)
- Process temperature up to 200 °C (392 °F)
- Explosion protection II 2G Ex [ib] IIC T6 to ATEX
- Easy and safe to clean

Application

The SITRANS P Compact pressure transmitter is designed for the special requirements of the food, pharmaceutical and biotechnology industries.

The use of high-grade materials guarantees compliance with hygiene regulations.

The SITRANS P Compact pressure transmitter is available in many versions. Exact adaptation of the pressure transmitter to conditions at the place of use is thus possible

Design

The electronics is potted to protect it against moisture, corrosive atmospheres and vibration.

Notes on operating the pressure transmitter

Compensation of internal atmospheric pressure

Compensation of the internal atmospheric pressure of the SITRANS P Compact pressure transmitters is performed as follows:

- in the plug versions by means of the screwed gland (IP65)
- in the field housings by means of an integral sintered filter (IP65) or a vented cable (IP67)
- in versions with cable outlet by means of a vented cable (IP67)

In the absolute pressure range there is no need for compensation with respect to atmospheric pressure.

Note: These degrees of protection are only achieved under the following conditions:

- if the pressure transmitter is installed correctly
- if the screwed glands are securely tightened
- if the cable diameters agree with the nominal diameters of the gaskets in the housing

Note: The integral EMC measures are only effective if the earth connection is made correctly.

CE marking

The CE marking of the pressure transmitter certifies compliance with the guidelines of the European Council (9/336/EC), the EMC law (13.11.1992), as well as the applicable generic standards.

Interference-free operation in systems and plants is achieved only if the specifications for shielding, earthing, cable routing and electrical isolation are observed during installation and assembly.

Hazardous areas

Note: Electrical equipment in hazardous areas must only be installed and operated by trained personnel.

Modifications to units and connections result in cancellation of the explosion protection and guarantee.

With intrinsically-safe circuits, make sure that equipotential bonding exists throughout the complete cabling inside and outside of the hazardous area. The limits specified in the ATEX approval must be observed.

Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

1

Function

The process pressure acts on a piezo-resistive semiconductor measuring bridge through a remote seal and a transmission liquid. The pressure transmitter converts the pressure values into a load-independent current.

A compensation network makes the output signal largely independent of the ambient temperature. As a result of a specially adapted remote seal connection with minimized volume, the influence of the process temperature on the output signal is greatly reduced compared to a conventional screw connection.

The pressure transmitters can be powered with a non-regulated DC voltage of 10 to 30 V. Output signals common to measuring technology are available.

Technical specifications

Pressure transmitters for food, pharmaceuticals and biotechnology

Mode of operation

Measuring principle piezo-resistive

Input

Measured variable gauge or absolute pressure
 Measuring range 0 ... 160 mbar (0 ... 2.32 psi)
 ...
 0 ... 40 bar (0 ... 580 psi)

Output

Output signal
 • 2-wire system 4 ... 20 mA
 • Three-wire system 0 ... 20 mA

Measuring accuracy

Acc. to IEC 60770-1
 Error in measurement at limit setting incl. hysteresis and reproducibility $\leq 0.2\%$ of full-scale value
 Adjustment accuracy $\leq \pm 0.2\%$ of full-scale value
 Step response time < 20 ms
Influence of ambient temperature
 On the enclosure
 • Zero point $< 0.2\%$ /10 K of full-scale value
 • Measuring span $< 0.2\%$ /10 K of full-scale value
 On the process connection (remote seals)
 • Flange remote seal
 - DN 25 / 1" 4.8 mbar/10 K (0.069 psi/10 K)
 - DN 32 / 1¼" 2.3 mbar/10 K (0.033 psi/10 K)
 - DN 40 / 1½" 1.6 mbar/10 K (0.023 psi/10 K)
 - DN 50 / 2" 0.6 mbar/10 K (0.009 psi/10 K)
 • Clamp-on seal
 - DN 25 / 1" 9.5 mbar/10 K (0.14 psi/10 K)
 - DN 32 / 1¼" 4.1 mbar/10 K (0.06 psi/10 K)
 - DN 40 / 1½" 3.9 mbar/10 K (0.05 psi/10 K)
 - DN 50 / 2" 3.9 mbar/10 K (0.05 psi/10 K)

The zero error specified for the process connection should be considered as a guideline for a standard design. We will produce a detailed system calculation on request. Systems with reduced remote seal errors are available on request.

Rated conditions

Installation conditions
 • Mounting position Any, vertical as standard
 Ambient conditions
 • Ambient temperature -10 ... +70 °C (14 ... 158 °F)
 • Storage temperature -10 ... +90 °C (14 ... 194 °F)
 • Process temperature Max. 200 °C (392 °F), depending on design
 • Degree of protection (to EN 60529) IP65, optional IP67
 • Electromagnetic Compatibility
 - Emitted interference To EN 50081 Part 1, issue 1993 (residential and industrial areas). The unit has no own emissions.
 - Noise immunity to EN 50082 Part 2, issue March 1995 (industrial areas)

Design

Weight (without remote seal)
 • Field enclosure ≈ 460 G (≈ 1.01 lb)
 • Enclosure with plug ≈ 200 g (≈ 0.44 lb)
 Enclosure
 • Designs
 • Field housing IP65 or IP67, with screwed gland
 • Angled plug DIN 43650, IP65
 • Cable connection, IP67
 • Round plug connector M12, IP65
 • Material Stainless steel, mat. no. 1.4404/316L/1.4305
 Material of union nut Polyamide (with electrical connection using plug or cable)
 Electronics unit potted with silicone
 Internal ventilation for measuring ranges < 16 bar (< 232 psi), through housing thread or connection cable depending on design
 Process connection
 • Versions See ordering data
 • Material of coupling Stainless steel, mat. no. 1.4404/316L

Power supply

Terminal voltage on transmitter 10 ... 30 V DC
 Rated voltage 24 V DC

Certificates and approvals

Classification according to pressure equipment directive (PED 97/23/EC)
 For gases of fluid group 1 and liquids of fluid group 1; complies with the requirements of article 3, paragraph 1 (appendix 1); assigned to category III, conformity evaluation module H by the TÜV Nord
 Explosion protection
 • Intrinsic safety "i"
 - Marking TÜV 03 ATEX 2099 X
 Ex II 2G Ex ib IIC T6

Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

1

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS P Compact pressure transmitters for pressure and absolute pressure with diaphragm flush at front		7MF8010-		SITRANS P Compact pressure transmitters for pressure and absolute pressure with diaphragm flush at front		7MF8010-	
2-wire system Process temperature up to 140 °C (284 °F) Accuracy: 0.2 % of full-scale value Output 4 ... 20 mA		1		2-wire system Process temperature up to 140 °C (284 °F) Accuracy: 0.2 % of full-scale value Output 4 ... 20 mA		1	
Housing design (stainless steel mat. No. 1.4404/316L) / electr. connection				Measured range			
Housing with angled plug to DIN 43650, IP65		1		Overload pressure			
Housing with round plug M12, IP65, union nut made of polyamide		2		(continued)			
Housing with round plug M12, IP65, union nut made of stainless steel		3		-1 ... +9 bar (-14.5 ... +130.5 psi)	30 bar (435 psi)	GA	
Stainless steel field housing (small) with cable gland, IP65		4		-1 ... +15 bar (-14.5 ... +217.6 psi)	50 bar (725 psi)	GB	
Stainless steel field housing (small) with cable gland, IP67		5		0 ... 1 bar a (0 ... 14.5 psia)	10 bar a (145 psia)	HA	
Internal ventilation for measuring ranges < 10 bar (< 145 psi)				0 ... 1.6 bar a (0 ... 23.2 psia)	10 bar a (145 psia)	HB	
Measured range				0 ... 2.5 bar a (0 ... 36.3 psia)	16 bar a (232 psia)	HC	
Overload pressure				0 ... 4 bar a (0 ... 58 psia)	16 bar a (232 psia)	HD	
0 ... 160 mbar (0 ... 2.32 psi)	2 bar (29 psi)		BB	0 ... 6 bar a (0 ... 87 psia)	30 bar a (435 psi)	HE	
0 ... 250 mbar (0 ... 3.63 psi)	2 bar (29 psi)		BC	0 ... 10 bar a (0 ... 145 psia)	30 bar a (435 psi)	JA	
0 ... 400 mbar (0 ... 5.8 psi)	6 bar (87 psi)		BD	Special version (add Order code and plain text)		ZA	P 1 Y
0 ... 600 mbar (0 ... 8.7 psi)	6 bar (87 psi)		BE	Explosion protection			
0 ... 1 bar (0 ... 14.5 psi)	10 bar (145 psi)		CA	without			1
0 ... 1.6 bar (0 ... 23.2 psi)	10 bar (145 psi)		CB	with, to ATEX 100a, II 2 G, Ex ib IIC T6			2
0 ... 2.5 bar (0 ... 36.3 psi)	16 bar (232 psi)		CC	Further designs			
0 ... 4 bar (0 ... 58 psi)	16 bar (232 psi)		CD	Please add "-Z" to Article No. and specify Order code			Order code
0 ... 6 bar (0 ... 87 psi)	30 bar (435 psi)		CE	Hygiene version			P01
0 ... 10 bar (0 ... 145 psi)	30 bar (435 psi)		DA	Roughness of process connection: Foil $R_a < 0.8 \mu\text{m}$ ($3.15 \cdot 10^{-8}$ inch); Welded seams $R_a < 1.5 \mu\text{m}$ ($5.9 \cdot 10^{-8}$ inch)			
0 ... 16 bar (0 ... 232 psi)	50 bar (725 psi)		DB	Integral cooling element			K01
0 ... 25 bar (0 ... 363 psi)	50 bar (725 psi)		DC	Process temperature max. 200 °C (392 °F) instead of 140 °C (284 °F)			
0 ... 40 bar (0 ... 580 psi)	70 bar (1015 psi)		DD	Connections for pipe			
-160 ... 0 mbar (-2.32 ... 0 psi)	2 bar (29 psi)		EB	Pipes to DIN 11850			R01
-250 ... 0 bar (-3.73 ... 0 psi)	2 bar (29 psi)		EC	ISO pipes to DIN 2463			R02
-400 ... 0 bar (-5.8 ... 0 psi)	6 bar (87 psi)		ED	Pipes to O. D. Tubing "BS 4825 Part 1"			R03
-600 ... 0 bar (-8.7 ... 0 psi)	6 bar (87 psi)		EE	Certificates			
-1 ... 0 bar (-14.5 ... 0 psi)	10 bar (145 psi)		FA	Quality inspection certificate (Factory calibration) to IEC 60770-2			C11
-1 ... 0.6 bar (-14.5 ... 8.7 psi)	10 bar (145 psi)		FB	Inspection certificate to EN 10204-3.1 Use of FDA-listed remote seal filling liquids certified by test report to EN 10204-2.2			C12 C17
-1 ... 1.5 bar (-14.5 ... 21.8 psi)	16 bar (232 psi)		FC	Roughness depth measurement R_a certified by test report to EN 10204-3.1			C18
-1 ... 3 bar (-14.5 ... 43.5 psi)	16 bar (232 psi)		FD	Certification to EHEDG for clamp-on seals with aseptic screwed gland to DIN 11864			C19
-1 ... 5 bar (-14.5 ... 72.5 psi)	30 bar (435 psi)		FE				

Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

1

Selection and Ordering data

Article No.

Ord. code

SITRANS P Compact pressure transmitters for pressure and absolute pressure with clamp-on remote seal

7MF8010 -

2-wire system

Process temperature up to 140 °C (284 °F)

Accuracy: 0.2 % of full-scale value

Output 4 ... 20 mA

2

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Clamp-on remote seal (screwed gland at both ends)

with quick-release clamps

Milk pipe union to DIN 11851 with threaded socket

- DN 25
- DN 32
- DN 40
- DN 50
- DN 65

AD
AE
AF
AG
AH

Clamp connection to DIN 32676

- DN 25
- DN 32
- DN 40
- DN 50
- DN 65

CD
CE
CF
CG
CHClamp connection to ISO 2852¹⁾

- 1 inch
- 1½ inch
- 2 inch
- 2½ inch

DM
DN
DP
DQ

Special version

(add Order code and plain text)

ZA

J 1 Y

Filling liquid

Food oil, FDA-listed

Medicinal white oil

Special version

(add Order code and plain text)

3

2

9

L 1 Y

Output signal

4 ... 20 mA

Special version

(add Order code and plain text)

1

9

M 1 Y

¹⁾ Please note the internal diameter of the pipe. Please specify pipe classes (see "Further designs")

Selection and Ordering data

Article No.

Ord. code

SITRANS P Compact pressure transmitters for pressure and absolute pressure with clamp-on remote seal

7MF8010 -

2-wire system

Process temperature up to 140 °C (284 °F)

Accuracy: 0.2 % of full-scale value

Output 4 ... 20 mA

2

Clamp-on seal with aseptic connection

Aseptic screwed gland to

DIN 11864-1, form A

with threaded socket

- 1 inch
- 1½ inch
- 2 inch

QM
QN
QPAseptic screwed NEUMO with threaded socket¹⁾

- DN 25
- DN 32
- DN 40
- DN 50
- DN 65

SD
SE
SF
SG
SHAseptic screwed NEUMO with clamp connection, form R¹⁾

- DN 25
- DN 32
- DN 40
- DN 50

TD
TE
TF
TG

Aseptic screwed gland SÜDMO with threaded socket W 501

- 1 inch
- 1½ inch
- 2 inch

VM
VN
VP

Aseptic screwed gland SÜDMO with clamp connection W 601

- 1 inch
- 1½ inch
- 2 inch

WM
WN
WP

Special version

(add Order code and plain text)

ZA

J 1 Y

Filling liquid

Food oil, FDA-listed

Medicinal white oil

Special version

(add Order code and plain text)

3

2

9

L 1 Y

Output signal

4 ... 20 mA

Special version

(add Order code and plain text)

1

9

M 1 Y

¹⁾ Please specify as well:
Connections for pipes: R01, R02 or R03, see table "Further designs" on next page

Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

1

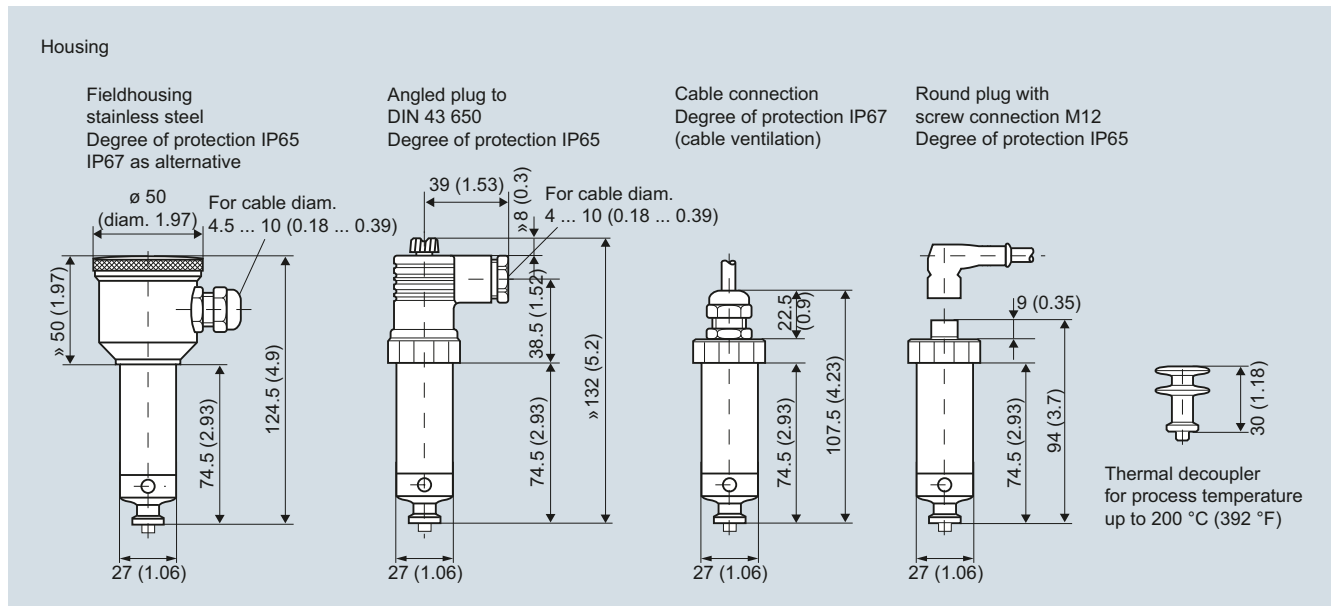
Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS P Compact pressure transmitters for pressure and absolute pressure with clamp-on remote seal		7 MF 8 0 1 0 -		SITRANS P Compact pressure transmitters for pressure and absolute pressure with clamp-on remote seal		7 MF 8 0 1 0 -	
2-wire system Process temperature up to 140 °C (284 °F) Accuracy: 0.2 % of full-scale value Output 4 ... 20 mA		2		2-wire system Process temperature up to 140 °C (284 °F) Accuracy: 0.2 % of full-scale value Output 4 ... 20 mA		2	
Housing design (stainless steel mat. No. 1.4404/316L) / electr. connection				Measured range Overload pressure (continued)			
Housing with angled plug to DIN 43650, IP65, union nut made of polyamide			1	-1 ... 9 bar (-14.5 ... 130.5 psi)			GA
Housing with round plug M12, IP65, union nut made of polyamide			2	-1 ... 15 bar (-14.5 ... 217.6 psi)			GB
Housing with round plug M12, IP65, union nut made of stainless steel			3	0 ... 1 bar a (0 ... 14.5 psia)			HA
Stainless steel field housing (small) with cable gland, IP65			4	0 ... 1.6 bar a (0 ... 23.2 psia)			HB
Stainless steel field housing (small) with cable gland, IP67 Internal ventilation for measuring ranges < 10 bar (< 145 psi)			5	0 ... 2.5 bar a (0 ... 36.3 psia)			HC
Measured range Overload pressure				0 ... 4 bar a (0 ... 58 psia)			HD
0 ... 160 mbar (0 ... 2.32 psi)	2 bar (29 psi)		BB	0 ... 6 bar a (0 ... 87 psia)			HE
0 ... 250 mbar (0 ... 3.63 psi)	2 bar (29 psi)		BC	0 ... 10 bar a (0 ... 145 psia)			JA
0 ... 400 mbar (0 ... 5.8 psi)	6 bar (87 psi)		BD	Special version (add Order code and plain text)			ZA
0 ... 600 mbar (0 ... 8.7 psi)	6 bar (87 psi)		BE	Explosion protection			P 1 Y
0 ... 1 bar (0 ... 14.5 psi)	10 bar (145 psi)		CA	without			1
0 ... 1.6 bar (0 ... 23.2 psi)	10 bar (145 psi)		CB	with, to ATEX 100a, II 2 G, Ex ib IIC T6			2
0 ... 2.5 bar (0 ... 36.3 psi)	16 bar (232 psi)		CC	Further designs			Order code
0 ... 4 bar (0 ... 58 psi)	16 bar (232 psi)		CD	Please add "-Z" to Article No. and specify Order code			
0 ... 6 bar (0 ... 87 psi)	30 bar (435 psi)		CE	Hygiene version			P01
0 ... 10 bar (0 ... 145 psi)	30 bar (435 psi)		DA	Roughness of process connection: Foil $R_a < 0.8 \mu\text{m}$ ($3.15 \cdot 10^{-8}$ inch); Welded seams $R_a < 1.5 \mu\text{m}$ ($5.9 \cdot 10^{-8}$ inch)			
0 ... 16 bar (0 ... 232 psi)	50 bar (725 psi)		DB	Integral cooling element			K01
0 ... 25 bar (0 ... 363 psi)	50 bar (725 psi)		DC	Process temperature max. 200 °C (392 °F) instead of 140 °C (284 °F)			
0 ... 40 bar (0 ... 580 psi)	70 bar (1015 psi)		DD	Connections for pipe			R01
-160 ... 0 mbar (-2.32 ... 0 psi)	2 bar (29 psi)		EB	Pipes to DIN 11850			R02
-250 ... 0 bar (-3.73 ... 0 psi)	2 bar (29 psi)		EC	ISO pipes to ISO 2463			R03
-400 ... 0 bar (-5.8 ... 0 psi)	6 bar (87 psi)		ED	Pipes to O. D. Tubing "BS 4825 Part 1"			
-600 ... 0 bar (-8.7 ... 0 psi)	6 bar (87 psi)		EE	Certificates			C11
-1 ... 0 bar (-14.5 ... 0 psi)	10 bar (145 psi)		FA	Quality inspection certificate (Five-step factory calibration) to IEC 60770-2			
-1 ... 0.6 bar (-14.5 ... 8.7 psi)	10 bar (145 psi)		FB	Inspection certificate to EN 10204-3.1 Use of FDA-listed remote seal filling liquids certified by test report to EN 10204-2.2			C12 C17
-1 ... 1.5 bar (-14.5 ... 21.8 psi)	16 bar (232 psi)		FC	Roughness depth measurement R_a certified by test report to EN 10204-3.1			C18
-1 ... 3 bar (-14.5 ... 43.5 psi)	16 bar (232 psi)		FD	Certification to EHEDG for clamp-on seals with aseptic screwed gland to DIN 11864			C19
-1 ... 5 bar (-14.5 ... 72.5 psi)	30 bar (435 psi)		FE				

Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

Dimensional drawings

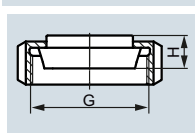


SITRANS P Compact, dimensions in mm (inch)

Process connections

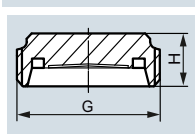
Diaphragm seal with quick-release clamp

Milk pipe union to DIN 11851 with slotted union nut



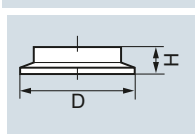
DN	PN	H mm (inch)	G
25	40	24 (0.95)	Rd. 52 x 1/6"
32	40	24 (0.95)	Rd. 58 x 1/6"
40	40	24 (0.95)	Rd. 65 x 1/6"
50	25	25.1 (0.99)	Rd. 78 x 1/6"
65	25	28.6 (1.13)	Rd. 95 x 1/6"

Milk pipe union to DIN 11851 with threaded socket



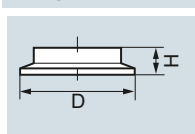
DN	PN	H mm (inch)	G
25	40	-	Rd. 52 x 1/6"
32	40	20 (0.79)	Rd. 58 x 1/6"
40	40	20 (0.79)	Rd. 65 x 1/6"
50	25	20 (0.79)	Rd. 78 x 1/6"
65	25	22 (0.87)	Rd. 95 x 1/6"

Clamp connection to DIN 32676



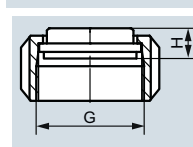
DN	PN	H mm (inch)	D mm (inch)
25	16	14 (0.55)	50.5 (2)
40	16	14 (0.55)	50.5 (2)
50	16	14 (0.55)	64 (2.52)

Clamp connection to ISO 2852



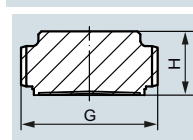
DN	PN	H mm (inch)	D mm (inch)
1"	16	14 (0.55)	50.5 (2)
1½"	16	12 (0.47)	50.5 (2)
2"	16	14 (0.55)	64 (2.52)
2½"	16	14 (0.55)	77.5 (3.05)

IDF standard with slotted union nut



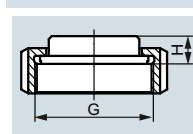
DN	PN	H mm (inch)	G inch (IDF thread)
1"	40	21 (0.83)	1"
1½"	40	13.5 (0.53)	1½"
2"	25	15 (0.59)	2"

IDF standard with threaded socket



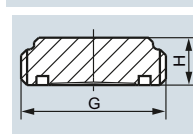
DN	PN	H mm (inch)	G inch (IDF thread)
1"	40	21 (0.83)	1"
1½"	40	13.5 (0.53)	1½"
2"	25	15 (0.59)	2"

SMS standard with slotted union nut



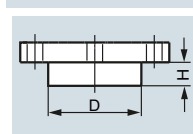
DN	PN	H mm (inch)	G
1"	40	16 (0.63)	Rd 40 x 1.6"
1½"	40	16 (0.63)	Rd 60 x 1.6"
2"	25	16 (0.63)	Rd 70 x 1.6"

SMS standard with threaded socket



DN	PN	H mm (inch)	G
1"	40	16 (0.63)	Rd 40 x 1.6"
1½"	40	20 (0.79)	Rd 60 x 1.6"
2"	25	20 (0.79)	Rd 70 x 1.6"

DRD flange, without welding-type flange



DN	PN	H mm (inch)	D mm (inch)
50	40	16.7 (0.66)	65.5 (2.58)

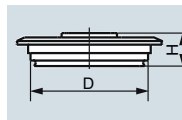
Pressure Measurement

Transmitters for basic requirements

SITRANS P Compact for gauge and absolute pressure

1

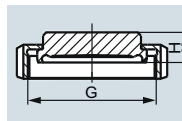
Varivent connection



DN	PN	H mm (inch)	D mm (inch)
25	25	19 (0.75)	50 (1.97)
40 ... 125	25/10	19 (0.75)	68 (2.68)

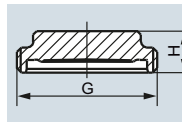
Diaphragm seal with aseptic connection

Aseptic screwed gland to DIN 11864-1, form A, with slotted union nut



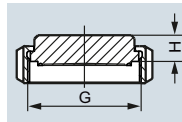
DN	PN	H mm (inch)	G
1"	40	20 (0.79)	Rd 52 x 1/6"
1½"	40	20 (0.79)	Rd 58 x 1/6"
2"	25	20 (0.79)	Rd 65 x 1/6"
2½"	25	20 (0.79)	Rd 78 x 1/6"

Aseptic screwed gland to DIN 11864-1, form A, with threaded socket



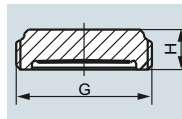
DN	PN	H mm (inch)	G
1"	40	15 (0.59)	Rd 52 x 1/6"
1½"	40	15 (0.59)	Rd 58 x 1/6"
2"	25	15 (0.59)	Rd 65 x 1/6"
2½"	25	15 (0.59)	Rd 78 x 1/6"

Aseptic screwed NEUMO BioConnect with slotted union nut



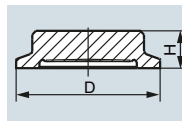
DN	PN	H mm (inch)	G
25	16	15 (0.59)	M 42 x 2
32	16	15 (0.59)	M 52 x 2
40	16	15 (0.59)	M 56 x 2
50	16	15 (0.59)	M 68 x 2

Aseptic screwed NEUMO BioConnect with threaded socket



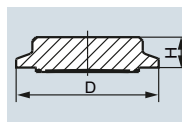
DN	PN	H mm (inch)	G
25	16	20 (0.79)	M 42 x 2
32	16	20 (0.79)	M 52 x 2
40	16	20 (0.79)	M 56 x 2
50	16	20 (0.79)	M 68 x 2

Aseptic screwed NEUMO BioConnect with clamp connection, form R



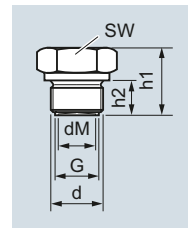
DN	PN	H mm (inch)	D mm (inch)
25	40	20 (0.79)	50.5 (2)
32	40	20 (0.79)	50.5 (2)
40	40	20 (0.79)	64 (2.52)
50	25	20 (0.79)	77.4 (3.05)

Aseptic screwed NEUMO BioConnect with clamp connection, form V



DN	PN	H mm (inch)	D mm (inch)
25	40	15 (0.59)	50.5 (2)
32	40	15 (0.59)	50.5 (2)
40	40	15 (0.59)	64 (2.52)
50	25	15 (0.59)	77.4 (3.05)

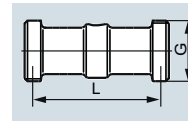
Male thread DIN 3852, form A



G	d mm (inch)	d _M mm (inch)	h ₁ mm (inch)	h ₂ mm (inch)	SW mm (inch)
G½A	26 (1.02)	17.5 (0.69)	27 (1.06)	14 (0.55)	27 (1.06)
G¾A	32 (1.26)	22.6 (0.89)	31 (1.22)	16 (0.63)	32 (1.26)
G1A	39 (1.54)	27 (1.06)	33 (1.30)	18 (0.71)	51 (2.01)
G1½A	55 (2.17)	40 (1.57)	40 (1.57)	22 (0.87)	55 (2.17)
G2A	68 (2.68)	51 (2.00)	42 (1.65)	24 (0.94)	70 (2.76)

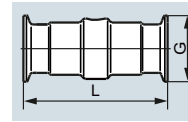
Clamp-on remote seal (screwed gland at both ends) with quick-release clamps

Milk pipe union to DIN 11851 with threaded socket



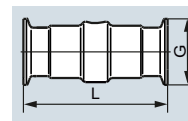
DN	PN	L mm (inch)	G
25	40	110 (4.33)	Rd 52 x 1/6"
32	40	110 (4.33)	Rd 58 x 1/6"
40	40	110 (4.33)	Rd 65 x 1/6"
50	25	110 (4.33)	Rd 78 x 1/6"
65	25	110 (4.33)	Rd 95 x 1/6"

Clamp connection to DIN 32676



DN	PN	L mm (inch)	D mm (inch)
25	16	110 (4.33)	50.5 (2)
32	16	110 (4.33)	50.5 (2)
40	16	110 (4.33)	50.5 (2)
50	16	110 (4.33)	64 (2.52)
65	10	110 (4.33)	91 (3.58)

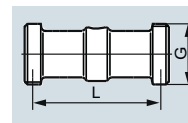
Clamp connection to ISO 2852



DN	PN	L mm (inch)	D mm (inch)
1"	16	110 (4.33)	50.5 (2)
1½"	16	110 (4.33)	50.5 (2)
2"	16	110 (4.33)	64 (2.52)
2½"	16	110 (4.33)	91 (3.58)

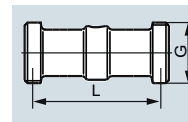
Clamp-on seal with aseptic connection

Aseptic screwed gland to DIN 11864-1, form A, with threaded socket



DN	PN	L mm (inch)	G
1"	40	110 (4.33)	Rd 52 x 1/6"
1½"	40	110 (4.33)	Rd 65 x 1/6"
2"	25	110 (4.33)	Rd 78 x 1/6"

Aseptic screwed NEUMO BioConnect with threaded socket



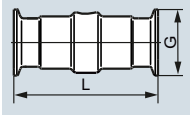
DN	PN	L mm (inch)	G
25	16	110 (4.33)	M 42 x 2
32	16	110 (4.33)	M 52 x 2
40	16	110 (4.33)	M 56 x 2
50	16	110 (4.33)	M 68 x 2
65	16	110 (4.33)	M 90 x 3

Pressure Measurement

Transmitters for basic requirements

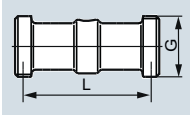
SITRANS P Compact for gauge and absolute pressure

Aseptic screwed NEUMO BioConnect with clamp connection, form R



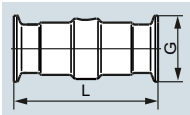
DN	PN	L mm (inch)	D mm (inch)
25	16	110 (4.33)	50.4 (2)
32	16	110 (4.33)	50.4 (2)
40	16	110 (4.33)	64 (2.52)
50	16	110 (4.33)	77.4 (3.05)

Aseptic screwed gland SÜDMO with threaded socket W 501



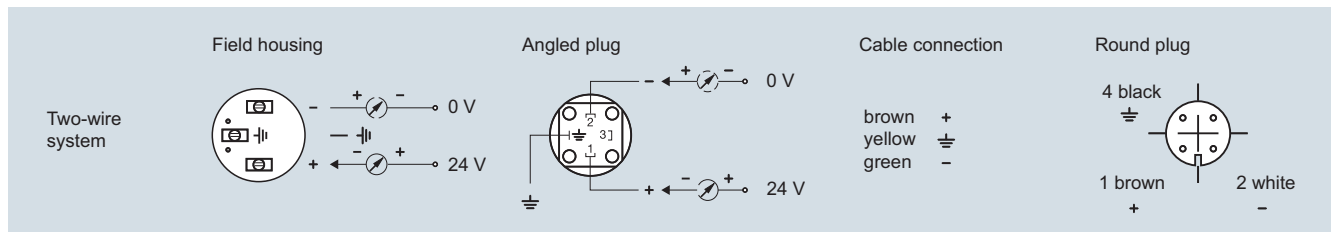
DN	PN	L mm (inch)	G
1"	25	110 (4.33)	Rd 44 x 1/6"
1 1/2"	25	110 (4.33)	Rd 58 x 1/6"
2"	20	110 (4.33)	Rd 78 x 1/6"

Aseptic screwed gland SÜDMO with threaded socket W 601



DN	PN	L mm (inch)	D mm (inch)
1"	16	110 (4.33)	50.5 (2)
1 1/2"	16	110 (4.33)	64 (2.52)
2"	16	110 (4.33)	77.5 (3.05)

Schematics



SITRANS P Compact, connection diagram

Overview



SITRANS P280 for flexible and cost-effective applications in pressure monitoring

- Supports the WirelessHART standard (HART V 7.1)
- Very high security level for wireless data transmission
- Built-in local user interface (LUI) with 3-button operation
- Optimum display and readability using graphical display (104 x 80 pixels) with integrated backlight
- Stand-by (deep sleep phase) can be activated and deactivated device with push of a button
- Battery power supply
- Battery service life up to 5 years
- Extend battery service life with HART modem interface which can be shut off
- Optimized power consumption through new design, and increase in battery service life.
- Simple configuration thanks to SIMATIC PDM
- Device meets IP65 degree of protection
- Can be used for absolute and gauge pressure measurements

Benefits

The SITRANS P280 is a pressure transmitter that features Wireless HART as the standard communication interface.

Also available is a wired interface to connect a HART modem:

- Flexible pressure measurements
- Save costs on wiring for difficult installation conditions. Wireless technology offers cost advantages in cases where extensive wiring cost would normally apply.
- It enables additional hitherto unfeasible measuring points, particularly for monitoring purposes.
- Easy installation on moveable equipment
- Enables cost-effective temporary measurements, for example for process optimizations.
- Optimum solution in addition to wired communication and new possibilities for system solutions in process automation

Application

The SITRANS P280 is a WirelessHART field device for measuring absolute and gauge pressure.

The measuring ranges for absolute and gauge pressure measurements are 0 to 1.6, 10, 50, 200 and 320 bar (0 to 23, 145, 725, 2900 and 4641 psi).

The sensor is integrated into the transmitter housing.

On the wireless communication side, the transmitter supports the WirelessHART standard. A HART modem can be connected to the transmitter particularly for initial commissioning, alternatively the device can be commissioned comfortably by means of the local pushbuttons w/o any additional handset devices.

It can be used in all industries and applications in non-explosive areas.

Design

The SITRANS P280 has a robust aluminum enclosure and is suitable for outside use. It conforms with the IP65 safety class.

The operating temperature range is -40 to +80 °C (-40 to +176 °F). Power supply is provided through an integrated battery, which is available as an accessory. The device is only approved for operation with this battery.

The aerial features a rotatable joint which can be used for directional alignment. Wireless signals can thus be optimally received and transmitted.

A special highlight is the option for direct operation on the device. The operating strategy used in this case seamlessly integrates into the strategy of all new Siemens field devices.

Using the device's control buttons, it is easy to turn the HART modem interface of the device on and off. The device can be put to passive status and reactivated at any time. This helps to extend the service life of the battery.

The SITRANS P280 transmitter features a ceramic measuring cell for gauge and absolute pressure measurements.

Function

The SITRANS P280 can join to a WirelessHART network. It can be parameterized and operated through this network. Measured process values are transported via the network to the SIEMENS IE/WSN-PA link.

Field device data received by the IE/WSN-PA LINK is transmitted to the connected systems, for example the process control system SIMATIC PCS 7. For an introduction of WirelessHART, please see the FI 01 catalogue, section 8 or <http://www.siemens.com/wirelesshart>.

Detailed information on IE/WSN-PA can be found in the FI 01 catalogue, section 7 or <http://www.siemens.com/wirelesshart>.

Pressure Measurement

Transmitters with WirelessHART

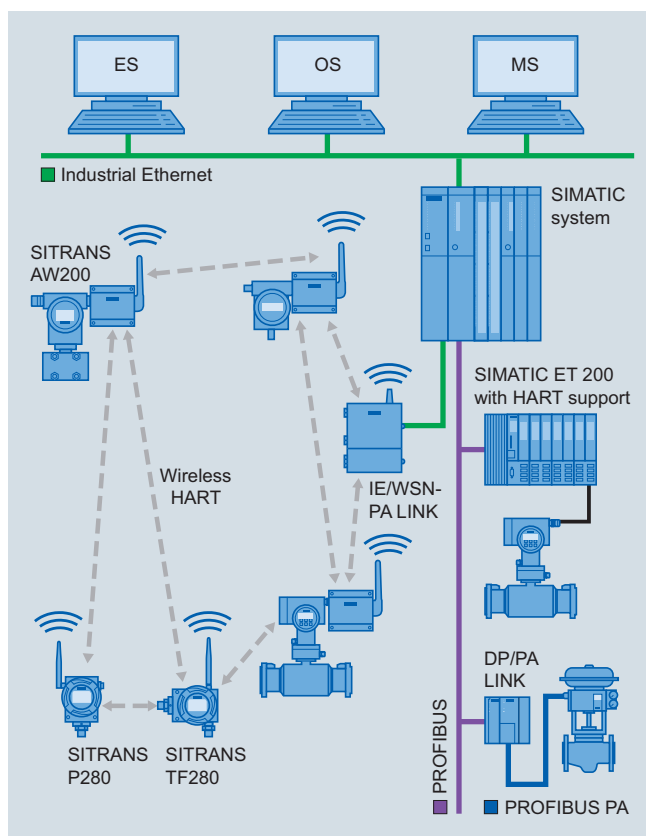
SITRANS P280 for gauge and absolute pressure

Integration

Connecting to SIMATIC PCS 7

The integration of field devices in SIMATIC PCS 7 and other process control systems can now be done seamlessly and cost-effectively with wireless technology, especially in situations where high wiring costs may be expected. Of particular interest are measuring points which are to be added and for which no MSR wiring is available.

Where larger distances between the IW/WSN-PA LINK and control systems need to be overcome, this connection can also be implemented on a wireless and cost-effective basis using the products of the SCALANCE W family.



Integration of a meshed network in SIMATIC PCS 7

Configuration

Configuration of the SITRANS P280 may be carried out as follows:

- Initial commissioning for the SITRANS P280 with SIMATIC PDM is generally carried out via a HART modem or the integrated local user interface, since the network ID and join key must be set up on the device before it can be accepted and integrated into the WirelessHART network.
- Once it is integrated into the network, the device can be conveniently operated with the WirelessHART network, the onsite HART modem or via the local user interface.
- Siemens WirelessHART devices operate with optimum coexistence to SCALANCE W family products.

Technical specifications

SITRANS P280 WirelessHART pressure transmitter

Mode of operation	
Measuring principle	piezo-resistive
Measured variable	Gauge and absolute pressure
Gauge pressure input	
Measuring range	Overload limit/Bursting pressure
0 ... 1.6 bar (0 ... 23 psi)	4 bar (58 psi)
0 ... 10 bar (0 ... 145 psi)	20 bar (290 psi)
0 ... 50 bar (0 ... 725 psi)	100 bar (1450 psi)
0 ... 200 bar (0 ... 2900 psi)	400 bar (5801 psi)
0 ... 320 bar (0 ... 4641 psi)	640 bar (9282 psi)
Units	mbar, bar, m4H ₂ O, i4H ₂ O, atm, Torr, gcm ² , kgcm ² , Pa, kPa, Mpa, psi, mmHG, mmH ₂ O, ftH ₂ O, inHG, inH ₂ O
Absolute pressure input	
Measuring range	Overload limit/Bursting pressure
0 ... 1.6 bar a (0 ... 23 psia)	4 bar a (58 psia)
0 ... 10 bar a (0 ... 145 psia)	20 bar a (290 psia)
0 ... 50 bar a (0 ... 725 psia)	100 bar a (1450 psia)
0 ... 200 bar a (0 ... 2900 psia)	400 bar a (5801 psia)
0 ... 320 bar a (0 ... 4641 psia)	640 bar a (9282 psia)
Units	mbar, bar, m4H ₂ O, i4H ₂ O, atm, Torr, gcm ² , kgcm ² , Pa, kPa, MPa, psi, mmHG, mmH ₂ O, ftH ₂ O, inHG, inH ₂ O
Output	
Output signal	2.4 GHz Wireless signal with TSMP (Time Synchronized Mesh Protocol)
Measuring accuracy	
	as per IEC 60770-1
Error in measurement at limit setting incl. hysteresis and reproducibility	typ. 0.17 % of sensor's span max. 0.25 % of sensor's span
Long-term stability	max. ± 0.25 % of sensor/year span
Influence of ambient temperature	typ. 0.07 %/10K, max. 0.2 %/10 K of sensor's span
Rated conditions	
Ambient conditions	
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F) (in ambient temperatures below -20 °C (-4 °F) and above +70 °C (158 °F), readability of the display is limited.)
• Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
• Relative humidity	< 95 %
Climatic class	4K4H in accordance with EN 60721-3-4 (stationary use at locations not protected against weather)
Degree of protection	IP65/NEMA 4
Allowable media temperature	-40 ... 85 °C (-40 ... +185 °F)

Pressure Measurement

Transmitters with WirelessHART

SITRANS P280 for gauge and absolute pressure

1

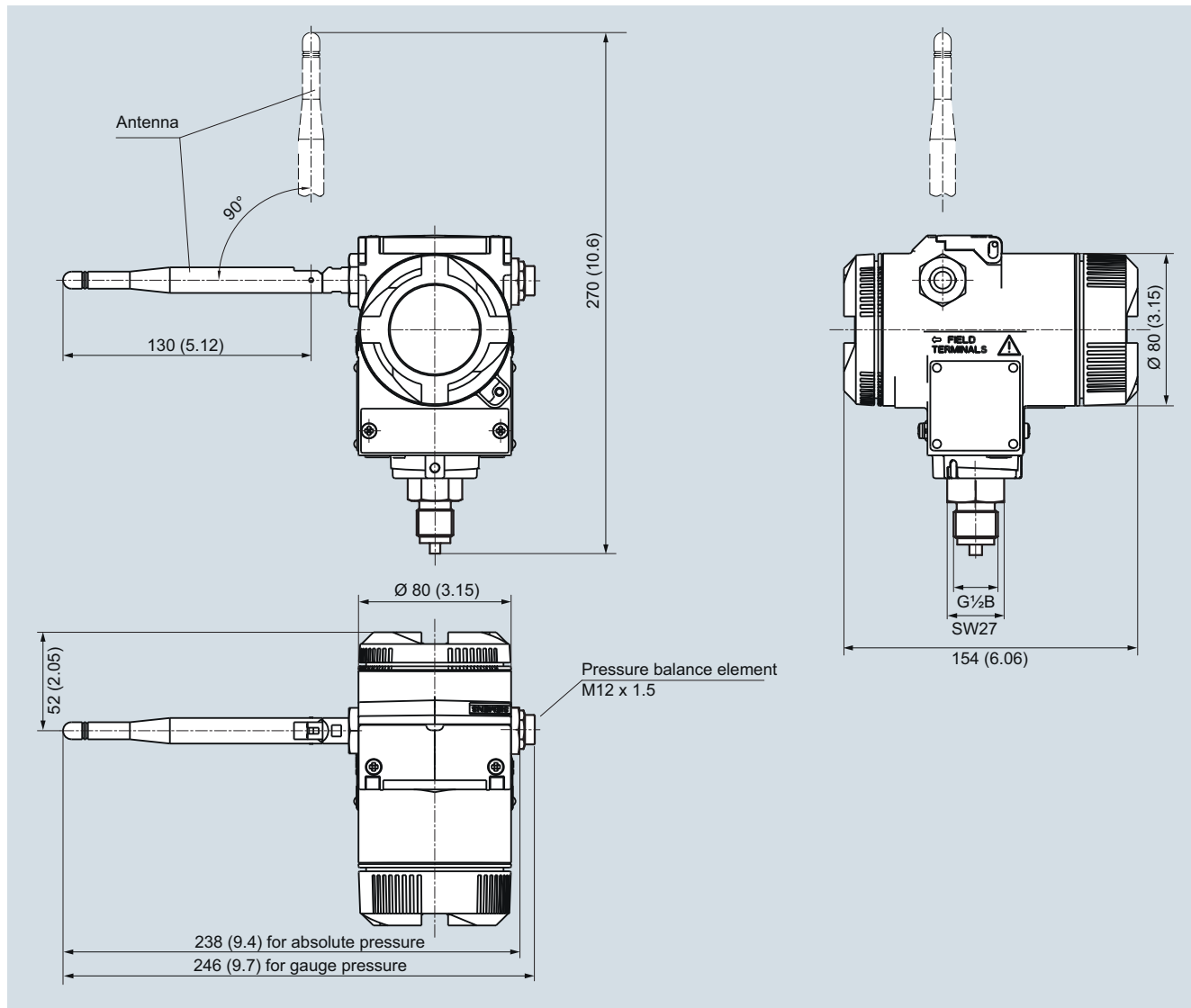
Design		Selection and Ordering data		Article No.
Enclosure material	low-copper die-cast aluminum, AC-AISI12(Fe)	SITRANS P280 WirelessHART pressure transmitter		7MP1120-
Shock resistance	in accordance with DIN EN 60068-2-29 / 03.95	(Required battery not included with delivery, see accessories)		0
Resistance to vibration	in accordance with DIN EN 60068-2-6/ 12.07	Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Weight		Measuring cell filling		
• without battery	1.5 kg (3.31 lb)	Dry measuring cell		0
• With battery	1.6 kg (3.53 lb)	Measuring span		
Dimensions (W x H x D)	See Dimensional drawing	Gauge pressure		
Process connection	<ul style="list-style-type: none"> G½B male thread as per EN837-1 ½-14 NPT 	0 ... 1.6 bar (0 ... 23 psi)		
Sensor break	Is recognized	0 ... 10 bar (0 ... 145 psi)		
		0 ... 50 bar (0 ... 725 psi)		
		0 ... 200 bar (0 ... 2900 psi)		
		0 ... 320 bar (0 ... 4641 psi)		
		Absolute pressure		
		0 ... 1.6 bar a (0 ... 3 psia)		
		0 ... 10 bar a (0 ... 145 psia)		
		0 ... 50 bar a (0 ... 725 psia)		
		0 ... 200 bar a (0 ... 2900 psia)		
		0 ... 320 bar a (0 ... 4641 psia)		
		Wetted parts		
		Ceramic		K
		Display		
		Display, visible		1
		Enclosure		
		Die-cast aluminum		1
		Process connection		
		G½ as per EN 837-1		0
		½-14 NPT		1
		Explosion protection		
		Without		A
		Antenna		A
		Variable, attached to device		
		Further designs		Order code
		Please add "-Z" to Article No. and specify Order code(s) and plain text.		
		Stainless steel tag plate (measuring point description)		Y15
		max. 16 digits entered in plain text		
		Y15:		
		Measuring point message		Y16
		max. 27 characters entered in plain text: Y16:		
		Accessories		Article No.
		Lithium battery for SITRANS TF280/P280		7MP1990-0AA00
		Mounting bracket, steel		7MF4997-1AC
		Mounting bracket, stainless steel		7MF4997-1AJ
		Cover, die-cast aluminum, without window		7MF4997-1BB
		Cover, die-cast aluminum, with window		7MF4997-1BE
		IE/WSN-PA LINK		see Sec. 7
		HART modem with USB interface		7MF4997-1DB
		SIMATIC PDM		see Sec. 8
		► Available ex stock		

Pressure Measurement

Transmitters with WirelessHART

SITRANS P280 for gauge and absolute pressure

Dimensional drawings

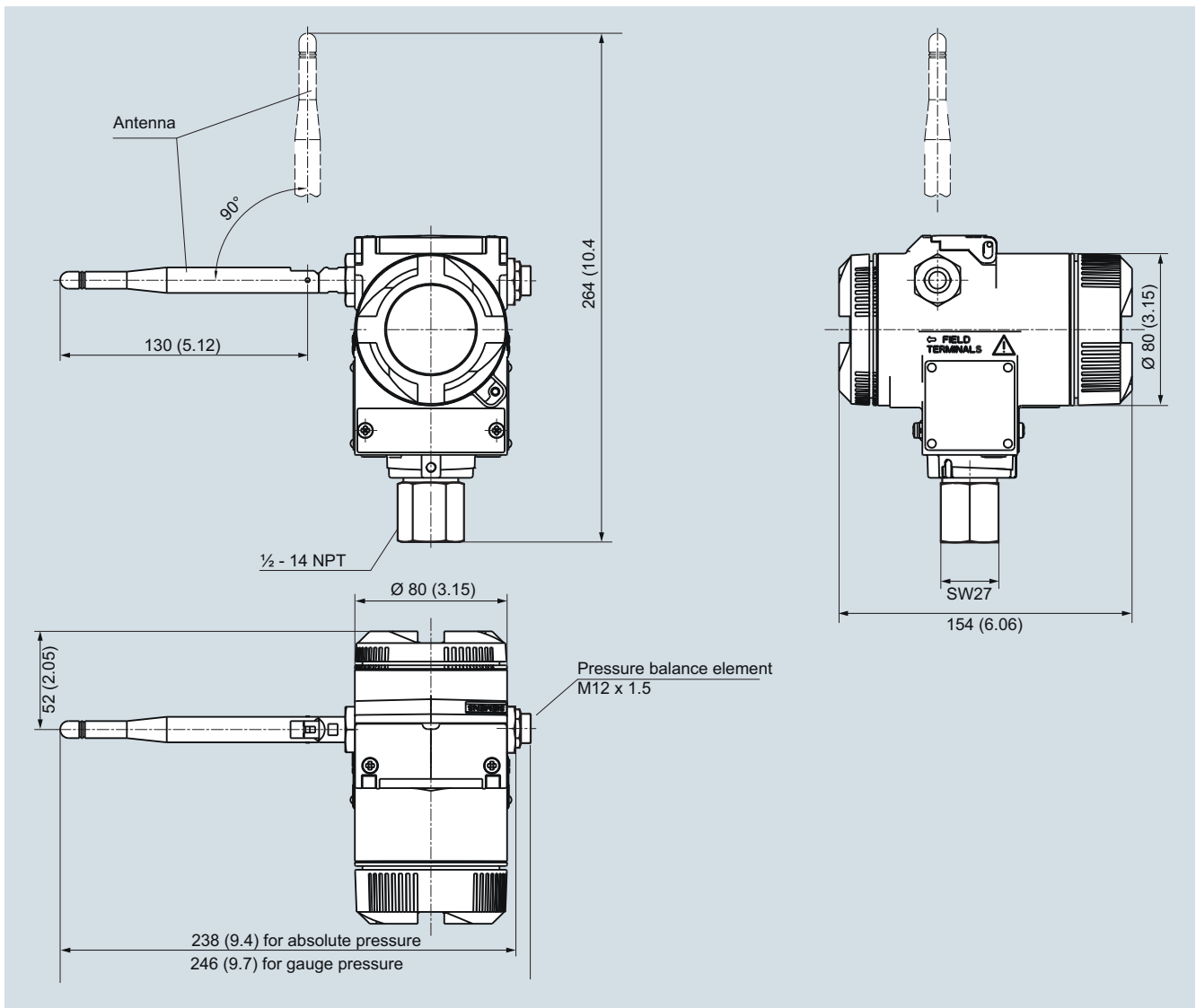


SITRANS P280 WirelessHART pressure transmitter, process connection G $\frac{1}{2}$ ", dimensions in mm (inch)
The dimensional drawing of the mounting bracket see on page 1/171.

Pressure Measurement Transmitters with WirelessHART

SITRANS P280 for gauge and absolute pressure

1



SITRANS P280 WirelessHART pressure transmitter, process connection 1/2 - 14 NPT, dimensions in mm (inch)
The dimensional drawing of the mounting bracket see on page 1/171.

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Overview



The SITRANS P300 is a digital pressure transmitter for relative and absolute pressure. The conventional thread versions are available as process connections, as are flush-mounted versions. A large number of the flush-mounted versions are suitable for food and pharmaceutical applications, and satisfy the EHEDG and 3A hygiene requirements.

The output signal is a load-independent direct current from 4 to 20 mA or a PROFIBUS PA or FOUNDATION signal, which is linearly proportional to the input pressure. Communication is via HART protocol or PROFIBUS PA interface. Convenient buttons for easy local operation of the basic settings of the pressure transmitter.

The SITRANS P300 has a single-chamber stainless steel casing. The pressure transmitter is approved with "intrinsically safe" type of protection. It can be used in zone 1 or zone 0.

Benefits

- High quality and service life
- High reliability even under extreme chemical and mechanical loads
- Extensive diagnosis and simulation functions
- Minimum conformity error
- Small long-term drift
- Wetted parts made of high-grade materials (such as stainless steel, Hastelloy)
- Measuring range 0.008 bar to 400 bar (0.1 psi to 5802 psi)
- High measuring accuracy
- Parameterization over control keys and HART or PROFIBUS PA or FOUNDATION Fieldbus

Application

The pressure transmitter is available in versions for gauge pressure and for absolute pressure. The output signal is always a load-independent direct current from 4 to 20 mA or a PROFIBUS PA or FOUNDATION Fieldbus signal, which is linearly proportional to the input pressure. The pressure transmitter measures aggressive, non-aggressive and hazardous gases, as well as vapors and liquids.

It can be used for the following measurement types:

- Gauge pressure
- Absolute pressure

With appropriate parameter settings, it can also be used for the following additional measurement types:

- Level
- Volume
- Mass

The "intrinsically-safe" Ex version of the transmitter can be installed in hazardous areas (zone 1). The transmitters are provided with an EC type examination certificate and comply with the respective harmonized European standards of ATEX.

Gauge pressure

This variant measures aggressive, non-aggressive and hazardous gases, vapors and liquids.

The smallest span is 0.01 bar (0.15 psi), the largest is 400 bar (5802 psi).

Level

With appropriate parameter settings, the gauge pressure variant measures the level of aggressive, non-aggressive and hazardous liquids.

For measuring the level in an open container you require one device; for measuring the level in a closed container, you require two devices and a process control system.

Absolute pressure

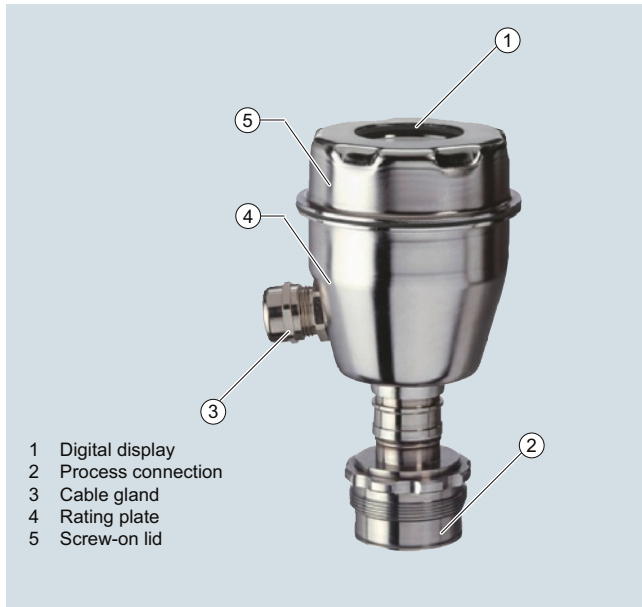
This variant measures the absolute pressure of aggressive, non-aggressive and hazardous gases, vapors and liquids.

The smallest span is 0.008 bar a (0.12 psia), the largest is 30 bar a (435 psia).

Design

The device comprises:

- Electronics
- Housing
- Measuring cell

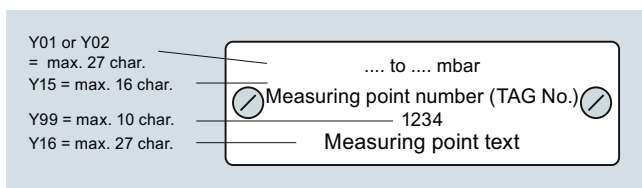


- 1 Digital display
- 2 Process connection
- 3 Cable gland
- 4 Rating plate
- 5 Screw-on lid

Perspective view of SITRANS P300

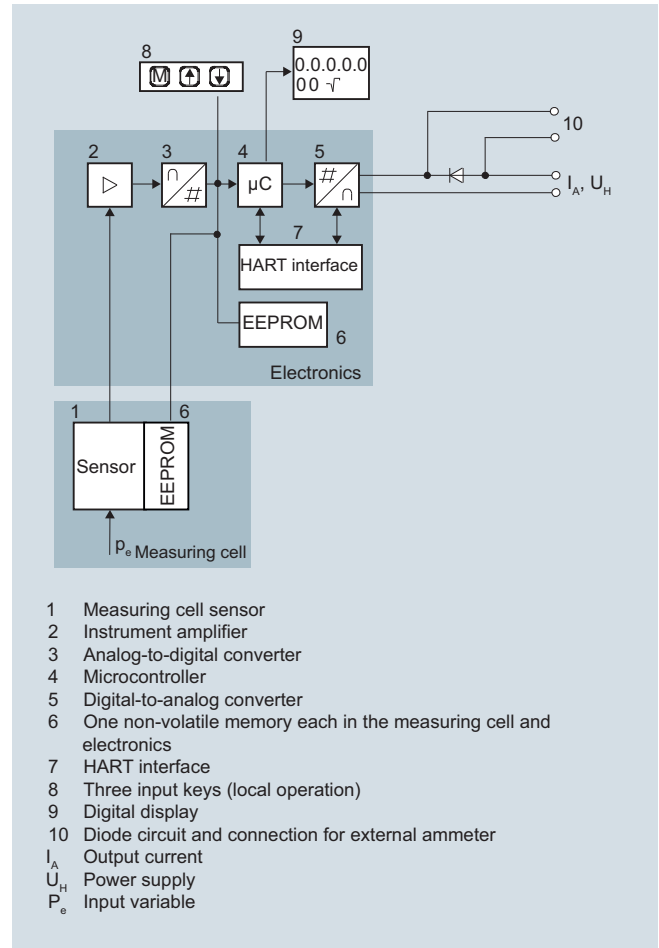
The housing has a screw-on lid (5) and, depending on the version, is with or without an inspection window. The electrical terminal housing, the buttons for operation of the device are located under this lid and, depending on the version, the display. The connections for the auxiliary power U_H and the shield are in the terminal housing. The cable gland is mounted on the side of the housing. The measuring cell with the process connection (2) is located on the bottom of the housing. The measuring cell with the process connection may differ from the one shown in the diagram, depending on the device version.

Example of attached measuring points sign



Function

Operation of electronics with HART communication



- 1 Measuring cell sensor
 - 2 Instrument amplifier
 - 3 Analog-to-digital converter
 - 4 Microcontroller
 - 5 Digital-to-analog converter
 - 6 One non-volatile memory each in the measuring cell and electronics
 - 7 HART interface
 - 8 Three input keys (local operation)
 - 9 Digital display
 - 10 Diode circuit and connection for external ammeter
- I_A Output current
 U_H Power supply
 P_o Input variable

Function diagram of electronics

The input pressure is converted into an electrical signal by the sensor (1). This signal is amplified by the measuring amplifier (2) and digitalized in an analog-to-digital converter (3). The digital signal is analyzed in a microcontroller (4) and corrected according to linearity and thermal characteristics. In a digital-to-analog converter (5) it is then converted into the output current of 4 to 20 mA. A diode circuit provides reverse polarity protection. You can make an uninterrupted current measurement with a low-ohm ammeter at the connection (10). The data specific to the measuring cell, the electronic data and parameter settings are stored in two non-volatile memories (6). The first memory is linked to the measuring cell, the second to the electronics.

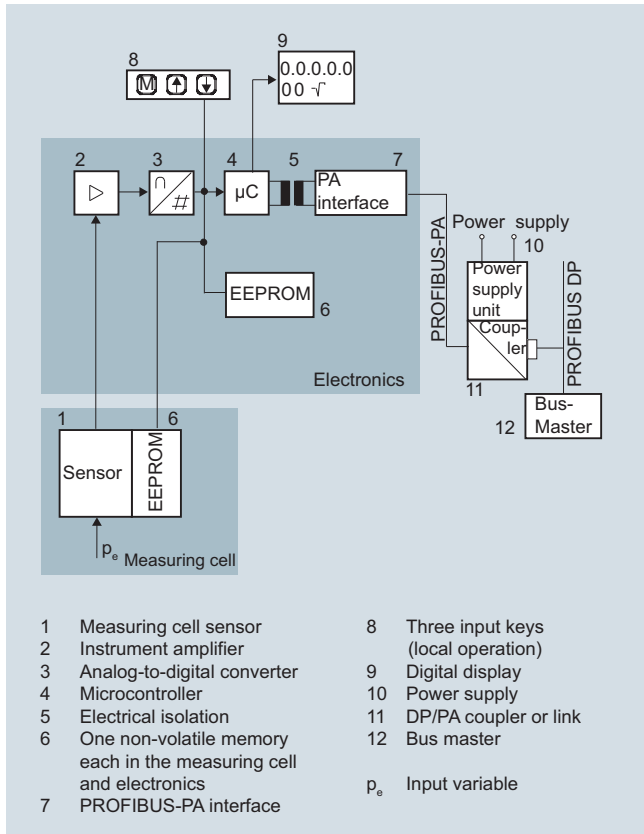
The buttons (8) can be used to call up individual functions, so-called modes. If you have a device with a display (9), you can use this to track mode settings and other messages. The basic mode settings can be changed with a computer via the HART modem (7).

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Operation of electronics with PROFIBUS PA communication

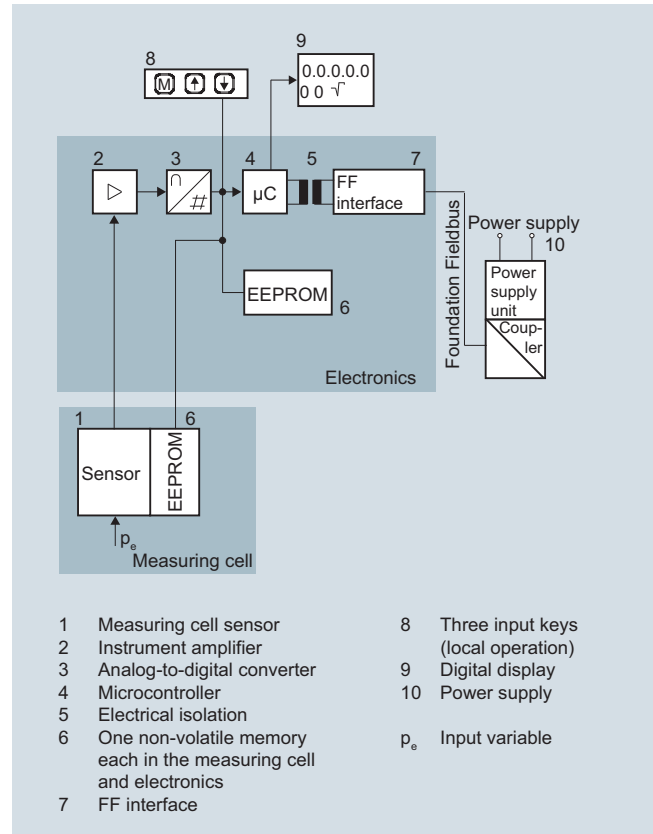


Function diagram of electronics

The input pressure is converted into an electrical signal by the sensor (1). This signal is amplified by the measuring amplifier (2) and digitalized in an analog-to-digital converter (3). The digital signal is analyzed in a microcontroller (4) and corrected according to linearity and thermal characteristics. It is then made available at the PROFIBUS PA over an electrically isolated PROFIBUS PA interface (7). The data specific to the measuring cell, the electronic data and parameter settings are stored in two non-volatile memories (6). The first memory is linked to the measuring cell, the second to the electronics.

The buttons (8) can be used to call up individual functions, so-called modes. If you have a device with a display (9), you can use this to track mode settings and other messages. The basic mode settings (12) can be changed with a computer over the bus master.

Operation of electronics with FOUNDATION Fieldbus communication



Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of electronics") amplified by the measuring amplifier (2) and digitalized in the analog-to-digital converter (3). The digital information is evaluated in the microcontroller, its linearity and temperature response corrected, and provided on the FOUNDATION Fieldbus through an electrically isolated FOUNDATION Fieldbus interface (7).

The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

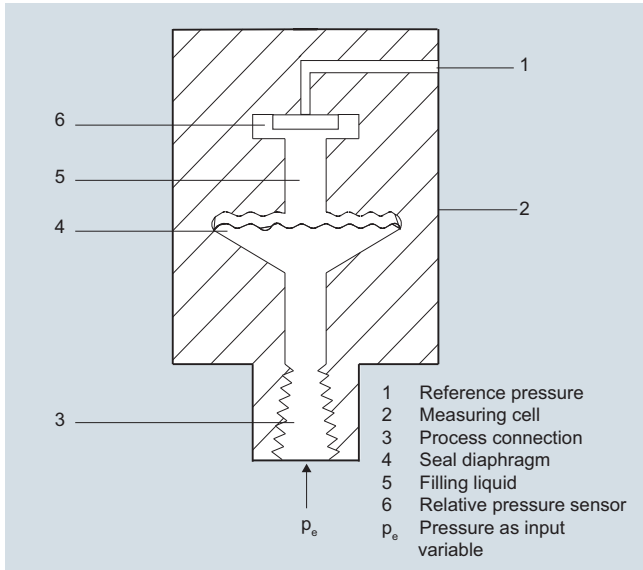
The results with status values and diagnostic values are transferred by cyclic data transmission on the FOUNDATION Fieldbus. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as National Instruments Configurator is required for this.

Mode of operation of the measuring cells

The process connections available include the following:

- G $\frac{1}{2}$
- $\frac{1}{2}$ -14 NPT
- Flush-mounted diaphragm:
 - Flanges to EN
 - Flanges to ASME
 - NuG and pharmaceutical connections

Measuring cell for gauge pressure

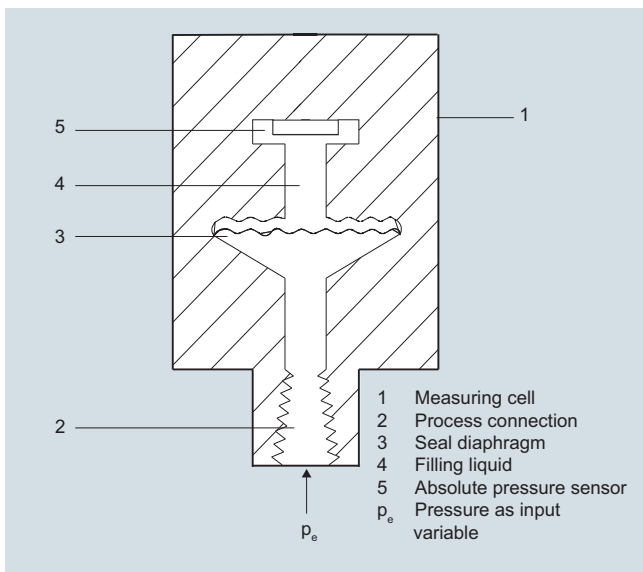


Measuring cell for gauge pressure, function diagram

The input pressure (p_e) is transferred to the gauge pressure sensor (6) via the seal diaphragm (4) and the filling liquid (5), displacing its measuring diaphragm. The displacement changes the resistance value of the four piezo resistors in the measuring diaphragm in a bridge circuit. The change in the resistance causes a bridge output voltage proportional to the input pressure.

Transmitters with spans ≤ 63 bar (≤ 926.1 psi) measure the input pressure compared to atmospheric, transmitters with spans of ≥ 160 bar (≥ 2352 psi) compared to a vacuum.

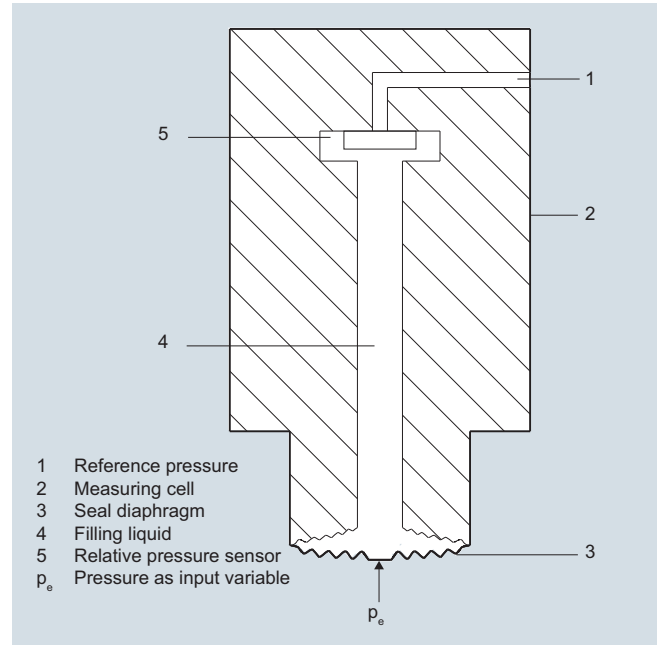
Measuring cell for absolute pressure



Measuring cell for absolute pressure, function diagram

The input pressure (p_e) is transferred to the absolute pressure sensor (5) via the seal diaphragm (3) and the filling liquid (4), displacing its measuring diaphragm. The displacement changes the resistance value of the four piezo resistors in the measuring diaphragm in a bridge circuit. The change in the resistance causes a bridge output voltage proportional to the input pressure.

Measuring cell for gauge pressure, front-flush diaphragm

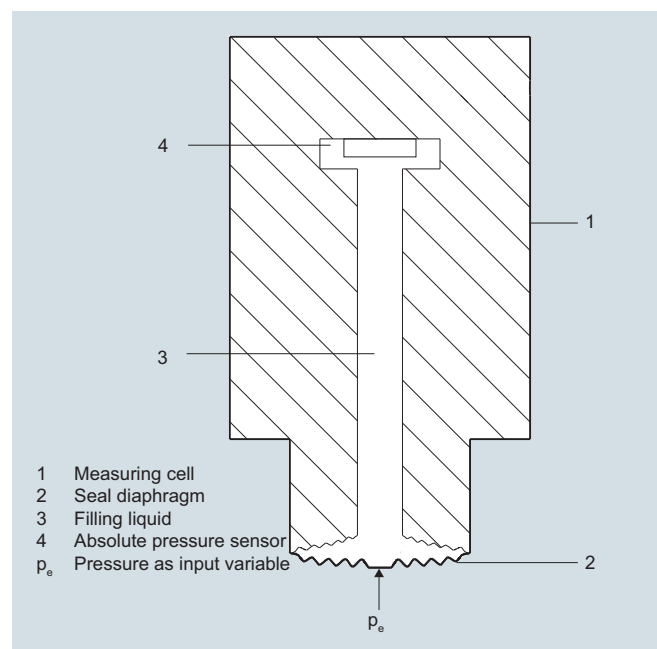


Measuring cell for gauge pressure, front-flush diaphragm, function diagram

The input pressure (p_e) is transferred to the gauge pressure sensor (6) via the seal diaphragm (4) and the filling liquid (5), displacing its measuring diaphragm. The displacement changes the resistance value of the four piezo resistors in the measuring diaphragm in a bridge circuit. The change in the resistance causes a bridge output voltage proportional to the input pressure.

Transmitters with spans ≤ 63 bar (≤ 926.1 psi) measure the input pressure compared to atmospheric, transmitters with spans of ≥ 160 bar (≥ 2352 psi) compared to a vacuum.

Measuring cell for absolute pressure, front-flush diaphragm



Measuring cell for absolute pressure, front-flush diaphragm, function diagram

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

The input pressure (p_e) is transferred to the absolute pressure sensor (5) via the seal diaphragm (3) and the filling liquid (4), displacing its measuring diaphragm. The displacement changes the resistance value of the four piezo resistors in the measuring diaphragm in a bridge circuit. The change in the resistance causes a bridge output voltage proportional to the input pressure.

Parameterization

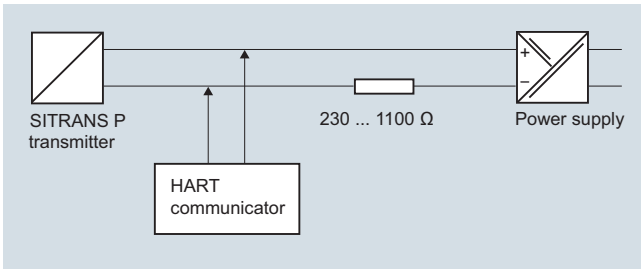
Depending on the version, there are a range of options for parameterizing the pressure transmitter and for setting or scanning the parameters.

Parameterization using the input buttons (local operation)

With the input buttons you can easily set the most important parameters without any additional equipment.

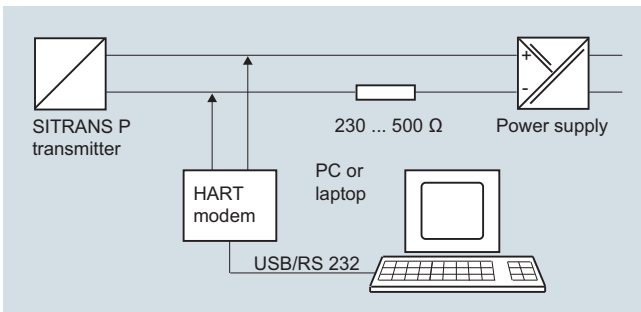
Parameterization using HART communication

Parameterization using HART communication is performed with a HART communicator or a PC.



Communication between a HART communicator and a pressure transmitter

When parameterizing with the HART communicator, the connection is made directly to the 2-wire cable.



HART communication between a PC communicator and a pressure transmitter

When parameterizing with a PC, the connection is made through a HART modem.

The signals needed for communication in conformity with the HART 5.x or 6.x protocols are superimposed on the output current using the Frequency Shift Keying (FSK) method.

Adjustable parameters on SITRANS P300 with HART communication

Parameters	Input keys	HART communication
Start of scale	x	x
Full-scale value	x	x
Electrical damping	x	x
Start-of-scale value without application of a pressure ("Blind setting")	x	x
Full-scale value without application of a pressure ("Blind setting")	x	x
Zero adjustment	x	x
current transmitter	x	x
Fault current	x	x
Disabling of buttons, write protection	x	x ¹⁾
Type of dimension and actual dimension	x	x
Input of characteristic		x
Freely-programmable LCD		x
Diagnostic functions		x

¹⁾ Cancel apart from write protection

Diagnostic functions for SITRANS P300 with HART communication

- Zero correction display
- Event counter
- Limit transmitter
- Saturation alarm
- Slave pointer
- Simulation functions
- Maintenance timer

Available physical units of display for SITRANS P300 with HART communication

Table style: Technical specifications 2

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	Pa, MPa, kPa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , inH ₂ O, inH ₂ O (4 °C), mmH ₂ O, ftH ₂ O (20 °C), inHg, mmHg
Level (height data)	m, cm, mm, ft, in
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , US gallon, Imp. gallon, bushel, barrel, barrel liquid
Mass	g, kg, t, lb, Ston, Lton, oz
Temperature	K, °C, °F, °R
Miscellaneous	%, mA

Parameterization through PROFIBUS PA interface

Fully digital communication through PROFIBUS PA, profile 3.0, is particularly user-friendly. The PROFIBUS connects the SITRANS P300 PA to a process control system, e.g. SIMATIC PSC 7. Communication is possible even in a potentially explosive environment.

For parameterization through PROFIBUS you need suitable software, e.g. SIMATIC PDM (Process Device Manager).

Parameterization through FOUNDATION Fieldbus interface

Fully digital communication through FOUNDATION Fieldbus is particularly user-friendly. Through the FOUNDATION Fieldbus the P300 is connected to a process control system. Communication is possible even in a potentially explosive environment.

For parameterization through the FOUNDATION Fieldbus you need suitable software, e.g. National Instruments Configurator.

Adjustable parameters for SITRANS P300 with PROFIBUS PA and FOUNDATION Fieldbus

Adjustable parameters	Input keys	PROFIBUS PA and FOUNDATION Fieldbus interface
Electrical damping	x	x
Zero adjustment (correction of position)	x	x
Buttons and/or function disabling	x	x
Source of measured-value display	x	x
Physical dimension of display	x	x
Position of decimal point	x	x
Bus address	x	x
Adjustment of characteristic	x	x
Input of characteristic		x
Freely-programmable LCD		x
Diagnostic functions		x

Diagnostic functions for SITRANS P300 with PROFIBUS PA and FOUNDATION Fieldbus

- Event counter
- Slave pointer
- Maintenance timer
- Simulation functions
- Display of zero correction
- Limit transmitter
- Saturation alarm

Physical dimensions available for the display

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	Mpa, kPa, Pa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , mmH ₂ O, mmH ₂ O (4 °C), inH ₂ O, inH ₂ O (4 °C), ftH ₂ O (20 °C), mmHg, inHg
Level (height data)	m, cm, mm, ft, in, yd
Mass	g, kg, t, lb, Ston, Lton, oz
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , US gallon, Imp. gallon, bushel, barrel, barrel liquid
volume flow	m ³ /s, m ³ /min, m ³ /h, m ³ /d, l/s, l/min, l/h, l/d, Ml/d, ft ³ /s, ft ³ /min, ft ³ /h, ft ³ /d, US gallon/s, US gallon/min, US gallon/h, US gallon/d, bbl/s, bbl/min, bbl/h, bbl/d
Mass flow	g/s, g/min, g/h, g/d, kg/s, kg/min, kg/h, kg/d, t/s, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/s, STon/min, STon/h, STon/d, LTon/s, LTon/min, LTon/h, LTon/d
Total mass flow	t, kg, g, lb, oz, LTon, STon
Temperature	K, °C, °F, °R
Miscellaneous	%

Hygiene version

In the case of the SITRANS P300 with 7MF812-... front-flush diaphragm, selected connections comply with the requirements of the EHEDG or 3A. You will find further details in the order form. Please note in particular that the seal materials used must comply with the requirements of 3A. Similarly, the filling liquids used must be FDA-compliant.

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Technical specifications

SITRANS P300 for gauge and absolute pressure

	HART	PROFIBUS PA and FOUNDATION Fieldbus		
Gauge pressure input				
Measured variable	Gauge pressure			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	0.01 ... 1 bar (0.15 ... 14.5 psi)	6 bar (87 psi)	1 bar (14.5 psi)	6 bar (87 psi)
	0.04 ... 4 bar (0.58 ... 58 psi)	10 bar (145 psi)	4 bar (58 psi)	10 bar (145 psi)
	0.16 ... 16 bar (2.3 ... 232 psi)	32 bar (464 psi)	16 bar (232 psi)	32 bar (464 psi)
	0.6 ... 63 bar (9.1 ... 914 psi)	100 bar (1450 psi)	63 bar (914 psi)	100 bar (1450 psi)
	1.6 ... 160 bar (23.2 ... 2321 psi)	250 bar (3626 psi)	160 bar (2321 psi)	250 bar (3626 psi)
	4.0 ... 400 bar (58 ... 5802 psi)	600 bar (8700 psi)	400 bar (5802 psi)	600 bar (8700 psi)
	Depending on the process connection, the span may differ from these values		Depending on the process connection, the nominal measuring range may differ from these values	
Lower measuring limit	30 mbar a (0.44 psia)			
• Measuring cell with silicone oil				
Upper measuring limit	100 % of the max. nominal measuring range			
• Measuring cell with silicone oil	100% of max. span			
Absolute pressure input				
Measured variable	Absolute pressure			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	8 ... 250 mbar a (0.12...3.63 psia)	6 bar a (87 psia)	250 mbar a (3.63 psia)	6 bar a (87 psia)
	43 ... 1300 mbar a (0.62...18.9 psia)	10 bar a (145 psia)	1.30 bar a (19 psia)	10 bar a (145 psia)
	0.16 ... 5 bar a (2.3 ... 73 psia)	30 bar a (435 psia)	5 bar a (73 psia)	30 bar a (435 psia)
	1 ... 30 bar a (14.5 ... 435 psia)	100 bar a (1450 psia)	30 bar a (435 psia)	100 bar a (1450 psia)
Lower measuring limit	0 mbar a (0 psia)			
• Measuring cell with silicone oil				
Upper measuring limit	100 % of the max. nominal measuring range			
• Measuring cell with silicone oil	100 % of max. span			
Input of gauge pressure, with front-flush diaphragm				
Measured variable	Gauge pressure, front-flush			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	0.01 ... 1 bar (0.15 ... 14.5 psi)	6 bar (87 psi)	1 bar (14.5 psi)	6 bar (87 psi)
	0.04 ... 4 bar (0.58 ... 58 psi)	10 bar (145 psi)	4 bar (58 psi)	10 bar (145 psi)
	0.16 ... 16 bar (2.32 ... 232 psi)	32 bar (464 psi)	16 bar (232 psi)	32 bar (464 psi)
	0.6 ... 63 bar (9.14 ... 914 psi)	100 bar (1450 psi)	63 bar (914 psi)	100 bar (1450 psi)
Lower measuring limit	100 mbar a (1.45 psia)			
Upper measuring limit	100 % of the max. nominal measuring range			
• Measuring cell with silicone oil	100% of max. span			

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

1

SITRANS P300 for gauge and absolute pressure

	HART			PROFIBUS PA and FOUNDATION Fieldbus		
Input of absolute pressure, with front-flush diaphragm	Absolute pressure, front-flush					
Measured variable	Absolute pressure, front-flush					
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure		
	43 ... 1300 mbar a (0.62 ... 18.85 psia)	10 bar a (145 psia)	1300 mbar a (18.85 psia)	10 bar a (145 psia)		
	0.16 ... 5 bar a (2.32 ... 72.5 psi a)	30 bar a (435 psia)	5 bar a (72.5 psia)	30 bar a (435 psia)		
	1 ... 30 bar a (14.5 ... 435 psia)	100 bar a (1450 psia)	30 bar a (435 psia)	100 bar a (1450 psia)		
	Depending on the process connection, the span may differ from these values			Depending on the process connection, the nominal measuring range may differ from these values		
Lower measuring limit	0 bar a (0 psia)					
Upper measuring limit						
• Measuring cell with silicone oil	100% of max. span			100 % of the max. nominal measuring range		
Output						
Output signal	4 ... 20 mA			Digital PROFIBUS PA signal		
Physical bus	-			IEC 61158-2		
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.					
Electrical damping T_{63} (step width 0.1 s)	Set to 2 s (0 ... 100 s)					
Measuring accuracy	According to IEC 60770-1					
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, measuring cell with silicone oil, room temperature 25 °C (77 °F)					
	Span ratio $r = \text{max. span/set span}$			Nominal measuring range ratio $r = \text{nominal measuring range/set measuring range}$		
Error in measurement at limit setting incl. hysteresis and reproducibility						
Linear characteristic	Gauge pressure	Absolute pressure	Absolute pressure, front-flush	Gauge pressure	Absolute pressure	Absolute pressure, front-flush
• $r + 10$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq 0.1 \%$	$\leq 0.2 \%$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq 0.1 \%$	$\leq 0.2 \%$
• $10 < r \leq 30$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq 0.2 \%$	$\leq 0.4 \%$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq 0.2 \%$	$\leq 0.4 \%$
• $30 < r \leq 100$	$\leq (0.005 \cdot r + 0.05) \%$	-	-	$\leq (0.005 \cdot r + 0.05) \%$	-	-
Step response time T_{63}	approx. 0.2 s					
Long-term stability at $\pm 30 \text{ °C}$ ($\pm 54 \text{ °F}$)	$\leq (0.25 \cdot r) \%/5 \text{ years}$	$\leq (0.1 \cdot r) \%/year$		$\leq (0.25 \cdot r)/5 \text{ years}$	$\leq (0.1 \cdot r) \%/year$	
Influence of ambient temperature						
• at $-10 \dots +60 \text{ °C}$ ($14 \dots 140 \text{ °F}$)	$\leq (0.08 \cdot r + 0.1) \%^{1)}$	$\leq (0.2 \cdot r + 0.3) \%$		$\leq (0.08 \cdot r + 0.1) \%^{1)}$	$\leq (0.2 \cdot r + 0.3) \%$	
• at $-40 \dots -10 \text{ °C}$ and $+60 \dots +85 \text{ °C}$ ($-40 \dots 14 \text{ °F}$ and $140 \dots 185 \text{ °F}$)	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.2 \cdot r + 0.3) \%/10 \text{ K}$		$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.2 \cdot r + 0.3) \%/10 \text{ K}$	
Influence of the medium temperature (only with front-flush diaphragm)						
• Temperature difference between medium temperature and ambient temperature	3 mbar/10 K (0.04 psi/10 K)					

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

SITRANS P300 for gauge and absolute pressure

	HART	PROFIBUS PA and FOUNDATION Fieldbus
Rated conditions		
<u>Installation conditions</u>		
Ambient temperature	Observe the temperature class in areas subject to explosion hazard.	
• Measuring cell with silicone oil	-40 ... +85 °C (-40 ... +185 °F)	
• Measuring cell with Neobee oil (FDA-compliant, with flush-mounted diaphragm)	-10 ... +85 °C (14 ... +185 °F)	
• Measuring cell with inert liquid (not with front-flush diaphragm)	-20 ... +85 °C (-4 ... +185 °F)	
• Display readable	-30 ... +85 °C (-22 ... +185 °F)	
• Storage temperature	-50 ... +85 °C (-58 ... +185 °F) (for Neobee: -20 ... +85 °C (-4 ... +185 °F)) (for temperature oil: -10 ... +85 °C (14 ... +165 °F))	
Climatic class		
Condensation	Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics	
Degree of protection acc. to EN 60529	IP65, IP68, NEMA X, enclosure cleaning, resistant to lyes, steam to 150 °C (302 °F)	
Electromagnetic Compatibility		
• Emitted interference and interference immunity	Acc. to IEC 61326 and NAMUR NE 21	
<u>Medium conditions</u>		
Temperature of medium		
• Measuring cell with silicone oil	-40 ... +100 °C (-40 ... +212 °F)	
• Measuring cell with silicone oil (FDA-compliant, with flush-mounted diaphragm)	-40 ... +150 °C (-40 ... +302 °F)	
• Measuring cell with Neobee oil *Measuring cell with Neobee oil (FDA-compliant, with flush-mounted diaphragm)	-10 ... +150 °C (-14 ... +302 °F)	
• Measuring cell with silicone oil, with temperature decoupler (only for gauge pressure version with flush-mounted diaphragm)	-40 ... +200 °C (-40 ... +392 °F)	
• Measuring cell with Neobee oil, with temperature decoupler (only for gauge pressure version with flush-mounted diaphragm)	-10 ... +200 °C (14 ... +392 °F)	
• Measuring cell with inert liquid	-20 ... +100 °C (-4 ... +212 °F)	
• Measuring cell with high-temperature oil (only for gauge pressure version with flush-mounted diaphragm)	-10 ... +250 °C (14 ... 482 °F)	
Design (standard version)		
Weight (without options)	Approx. 800 g (1.8 lb)	
Enclosure material	Stainless steel, mat. no. 1.4301/304	
Material of parts in contact with the medium		
• Connection shank	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819	
• Oval flange	Stainless steel, mat. no. 1.4404/316L	
• Seal diaphragm	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819	
• Measuring cell filling	<ul style="list-style-type: none"> •Silicone oil •Inert filling liquid 	
Process connection	<ul style="list-style-type: none"> •G½B to EN 837-1 •Female thread ½-14 NPT •Oval flange PN 160 (MAWP 2320 psi) with fastening thread: <ul style="list-style-type: none"> -7/16 -20 UNF to IEC 61518 •M10 as per DIN 19213 	

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

1

SITRANS P300 for gauge and absolute pressure		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Design (version with front-flush diaphragm)		
Weight (without options)	approx. 1 ... 13 kg (2.2 ... 29 lb)	
Enclosure material	Stainless steel, mat. no. 1.4301/304	
Material of parts in contact with the medium	Stainless steel, mat. no. 1.4404/316L	
• Process connection	Stainless steel, mat. no. 1.4404/316L	
• Seal diaphragm	<ul style="list-style-type: none"> •Silicone oil •Inert filling liquid 	
• Measuring cell filling	<ul style="list-style-type: none"> •FDA compliant fill fluid (Neobee oil) 	
Process connection	<ul style="list-style-type: none"> •Flanges as per EN and ASME •F&B and pharmaceutical flanges 	
Surface quality touched-by-media	R_a -values $\leq 0.8 \mu\text{m}$ (32 $\mu\text{-inch}$)/welds $R_a \leq 1.6 \mu\text{m}$ (64 $\mu\text{-inch}$) (Process connections acc. to 3A; R_a -values $\leq 0.8 \mu\text{m}$ (32 $\mu\text{-inch}$)/welds $R_a \leq 0.8 \mu\text{m}$ (32 $\mu\text{-inch}$)	
Power supply U_H		
Terminal voltage on transmitter	10.5 ... 42 V DC for intrinsically safe operation: 10.5 ... 30 V DC	Supplied through bus
Separate power supply	-	Not necessary
Bus voltage		
• Without Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Max. basic current	-	12.5 mA
• Start-up current \leq basic current	-	Yes
• Max. fault current in the event of a fault	-	15.5 mA
Fault disconnection electronics (FDE)	-	Available
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of Article 3, paragraph 3 (sound engineering practice)	
Water, waste water	In preparation	
<u>Explosion protection</u>		
Intrinsic safety "i"	PTB 05 ATEX 2048	
• Marking	Ex II 1/2 G Ex ia/ib IIB/IIC T4, T5, T6	
• Permissible ambient temperature		
- Temperature class T4	-40 ... +85 °C (-40 ... +185 °F)	
- Temperature class T5	-40 ... +70 °C (-40 ... +158 °F)	
- Temperature class T6	-40 ... +60 °C (-40 ... +140 °F)	
• Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$	To certified intrinsically-safe circuits with peak values: <u>FISCO supply unit:</u> $U_i = 17.5 \text{ V}$, $I_i = 380 \text{ mA}$, $P_i = 5.32 \text{ W}$ <u>Linear barrier:</u> $U_i = 24 \text{ V}$, $I_i = 250 \text{ mA}$, $P_i = 1.2 \text{ W}$
• Effective inner capacitance:	$C_i = 6 \text{ nF}$	$C_i = 1.1 \text{ nF}$
• Effective internal inductance:	$L_i = 0.4 \text{ mH}$	$L_i \leq 7 \mu\text{H}$
Explosion protection to FM for USA and Canada (cFM _{US})		
• Identification (DIP) or (IS); (NI)	Certificate of Compliance 3025099 CL I, DIV 1, GP ABCD T4 ... T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4 ... T6; CL I, DIV 2, GP ABCD T4 ... T6; CL II, DIV 2, GP FG; CL III	
• Identification (DIP) or (IS)	Certificate of Compliance 3025099C CL I, DIV 1, GP ABCD T4 ... T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC 4 ... T6; CL I, DIV 2, GP ABCD T4 ... T6; CL II, DIV 2, GP FG; CL III	

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

SITRANS P300 for gauge and absolute pressure

	HART	PROFIBUS PA and FOUNDATION Fieldbus
Dust explosion protection for zone 20/21/22		PTB 05 ATEX 2048
• Marking		Ex II 1D Ex ia D 20 T 120 °C Ex II 2D Ex ib D 21 T 120 °C Ex II 3D Ex ib D 21 T 120 °C
• Permissible ambient temperature		
- Temperature class T4	-40 ... +85 °C (-40 ... +185 °F) (in the case of mineral glass windows only -20 ... +85 °C (-4 ... +185 °F))	
- Temperature class T5	-40 ... +70 °C (-40 ... +158 °F) (in the case of mineral glass windows only -20 ... +70 °C (-4 ... +158 °F))	
- Temperature class T6	-40 ... +60 °C (-40 ... +140 °F) (in the case of mineral glass windows only -20 ... +60 °C (-4 ... +140 °F))	
• Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$	To certified intrinsically-safe circuits with peak values: $U_i = 24 \text{ V}$, $I_i = 380 \text{ mA}$, $P_i = 5.32 \text{ mW}$
• Effective inner capacitance:	$C_i = 6 \text{ nF}$	$C_i = 5 \text{ nF}$
• Effective internal inductance:	$L_i = 0.4 \mu\text{H}$	$L_i = 10 \mu\text{H}$
Type of protection Ex nA/nL/ic (Zone 2)		PTB 05 ATEX 2048
• Marking		II 2/3 G Ex nA T4/T5/T6 II 2/3 G Ex nL IIB/IIC T4/T5/T6
• Permissible ambient temperature		
- Temperature class T4	-40 ... +85 °C (-40 ... +185 °F) (in the case of mineral glass windows only -20 ... +85 °C (-4 ... +185 °F))	
- Temperature class T5	-40 ... +70 °C (-40 ... +158 °F) (in the case of mineral glass windows only -20 ... +70 °C (-4 ... +158 °F))	
- Temperature class T6	-40 ... +60 °C (-40 ... +140 °F) (in the case of mineral glass windows only -20 ... +60 °C (-4 ... +140 °F))	
• Ex nA/nL connection	To certified intrinsically-safe circuits with peak values: $U_m = 45 \text{ V}$	To certified intrinsically-safe circuits with peak values: $U_m = 32 \text{ V}$
• Ex ic connection	To certified intrinsically-safe circuits with peak values: $U_i = 45 \text{ V}$	To certified intrinsically-safe circuits with peak values: $U_i = 32 \text{ V}$
• Effective inner capacitance:	$C_i = 6 \text{ nF}$	$C_i = 5 \text{ nF}$
• Effective internal inductance:	$L_i = 0.4 \text{ mH}$	$L_i = 20 \mu\text{H}$

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.064 · r + 0.08) %/28 °C (50 °F).

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

1

HART Communication		FOUNDATION Fieldbus communication	
HART communication	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting Address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0.1 or 2 (totalizer mode and reset function for dosing)	• PID	1 resource block
• Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping adjustable	0 ... 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input /Output		
- Failure function	parameterizable (last good value, substitute value, incorrect value)		
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output		
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Selection and Ordering data		Article No.
SITRANS P300 pressure transmitters for relative and absolute pressure , single-chamber measuring housing, rating plate inscription in English		
4 ... 20 mA/HART		7 MF 8 0 2 3 -
PROFIBUS PA		7 MF 8 0 2 4 -
FOUNDATION Fieldbus (FF)		7 MF 8 0 2 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	1
Inert liquid	Cleanliness level 2 to DIN 25410	3
max. span (min. ... max.)		
0.01 ... 1 bar	(0.145 ... 14.5 psi)	B
0.04 ... 4 bar	(0.58 ... 58 psi)	C
0.16 ... 16 bar	(2.32 ... 232 psi)	D
0.63 ... 63 bar	(9.14 ... 914 psi)	E
1.6 ... 160 bar	(23.2 ... 2320 psi)	F
4 ... 400 bar	(58 ... 5802 psi)	G
2.5 ... 250 mbar a	(0.04 ... 3.63 psia)	Q
13 ... 1300 mbar a	(0.19 ... 18.86 psia)	S
0.05 ... 5 bar a	(0.7 ... 72.5 psia)	T
0.3 ... 30 bar a	(4.35 ... 435 psia)	U
Wetted parts materials		
Seal diaphragm	Measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version for diaphragm seal ^{1) 2) 3) 4) 5)}		Y
Process connection		
• Connection shank G $\frac{1}{2}$ B to EN 837-1		0
• Female thread $\frac{1}{2}$ -14 NPT		1
• Stainless steel oval flange with process connection (Oval flange has no female thread) ⁶⁾		
- Mounting thread $\frac{7}{16}$ -20 UNF to EN 61518		2
- Mounting thread M10 to DIN 19213		3
- Mounting thread M12 to DIN 19213		4
• Male thread M20 x 1.5		5
• Male thread $\frac{1}{2}$ -14 NPT		6
Non-wetted parts materials		
• Stainless steel, deep-drawn and electrolytically polished		4
Version		
• Standard versions		1
Explosion protection		
• None		A
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"		B
• Zone 20/21/22 ⁷⁾		C
• Ex nA/nL (Zone 2) ⁸⁾		E
• with FM "intrinsic safety" (cFM _{US})		M
Electrical connection / cable entry		
• Screwed gland M20x1.5 (polyamide) ⁹⁾		A
• Screwed gland M20x1.5 (metal)		B
• Screwed gland M20x1.5 (stainless steel)		C
• M12 connectors (metal), without cable socket		F
• M12 connectors (stainless steel), without cable		G
• Screwed gland $\frac{1}{2}$ -14 NPT metal thread ¹⁰⁾		H
• Screwed gland $\frac{1}{2}$ -14 NPT stainless steel thread		J

Selection and Ordering data		Article No.
SITRANS P300 pressure transmitters for relative and absolute pressure , single-chamber measuring housing, rating plate inscription in English		
4 ... 20 mA/HART		7 MF 8 0 2 3 -
PROFIBUS PA		7 MF 8 0 2 4 -
FOUNDATION Fieldbus (FF)		7 MF 8 0 2 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Display		
• Without display, with keys, closed lid		1
• With display and keys, closed lid ¹¹⁾		2
• With display and keys, lid with Makrolon pane (setting on HART devices: mA, with PROFIBUS PA and FOUNDATION Fieldbus equipment: pressure units) ¹¹⁾		4
• With display and keys (setting acc. to specifications, Order code "Y21" or "Y22" required), lid with Makrolon pane ¹¹⁾		5
• With display and keys, lid with glass pane (setting on HART devices: mA, with PROFIBUS and FOUNDATION Fieldbus equipment: pressure units) ¹¹⁾		6
• With display and keys (setting acc. to specifications, Order code "Y21" or "Y22" required), lid with glass pane ¹¹⁾		7
Power supply units see Chap. 7 "Supplementary Components".		
Included in delivery of the device:		
• Brief instructions (Leporello)		
• CD-ROM with detailed documentation		
1) When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here.		
2) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.		
3) The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF802-...Y-... and 7MF4900-1...-B		
4) The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.		
5) Remote seal for direct mounting only available in combination with process connection $\frac{1}{2}$ -14 NPT.		
6) M10 fastening thread: Max. span 160 bar (2320 psi) 7/16-20 UNF and M12 fastening thread: Max. span 400 bar (5802 psi)		
7) Only available together with electrical connection option A		
8) Only available together with electrical connection options B, C or G.		
9) Only together with HART electronics.		
10) Without cable gland.		
11) Display cannot be turned.		

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

1

Selection and Ordering data		Article No.	Selection and Ordering data		Article No.
SITRANS P300 pressure transmitters for relative and absolute pressure with front-flush membrane , single-chamber measuring housing, rating plate inscription in English			SITRANS P300 pressure transmitters for relative and absolute pressure with front-flush membrane , single-chamber measuring housing, rating plate inscription in English		
4 ... 20 mA/HART		7 MF 8 1 2 3 -	4 ... 20 mA/HART		7 MF 8 1 2 3 -
PROFIBUS PA		7 MF 8 1 2 4 -	PROFIBUS PA		7 MF 8 1 2 4 -
FOUNDATION Fieldbus (FF)		7 MF 8 1 2 5 -	FOUNDATION Fieldbus (FF)		7 MF 8 1 2 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Measuring cell filling	Measuring cell cleaning		Display		
Silicone oil	normal	1	• Without display, with keys, closed lid		1
Inert liquid	Cleanliness level 2 to DIN 25410 ¹⁾	3	• With display and keys, closed lid ⁸⁾		2
FDA compliant fill fluid			• With display and keys, lid with Makrolon pane (setting on HART devices: mA, with PROFIBUS PA and FOUNDATION Fieldbus equipment: pressure units) ⁸⁾		4
• Neobee oil	normal	4	• With display and keys (setting acc. to specifications, Order code "Y21" or "Y22" required), lid with Makrolon pane ⁸⁾		5
max. span			• With display and keys, lid with glass pane (setting on HART devices: mA, with PROFIBUS PA and FOUNDATION Fieldbus equipment: pressure units) ⁸⁾		6
0.01 ... 1 bar	(0.15 ... 14.5 psi)	B	• With display and keys (setting acc. to specifications, Order code "Y21" or "Y22" required), lid with glass pane ⁸⁾		7
0.04 ... 4 bar	(0.58 ... 58 psi)	C			
0.16 ... 16 bar	(2.32 ... 232 psi)	D			
0.63 ... 63 bar	(9.14 ... 914 psi)	E			
13 ... 1300 mbar a ²⁾	(0.19 ... 18.9 psia) ²⁾	S			
0.05 ... 5 bar a ²⁾	(0.7 ... 72.5 psia) ²⁾	T			
0.03 ... 30 bar a ²⁾	(4.35 ... 435 psia) ²⁾	U			
Wetted parts materials			Power supply units see Chap. 7 "Supplementary Components"		
Seal diaphragm	Measuring cell		Included in delivery of the device:		
Stainless steel	Stainless steel	A	• Brief instruction (Leporello)		
Hastelloy ³⁾	Stainless steel	B	• CD-ROM with detailed documentation		
Process connection					
• Flange version with Order code M..., N..., R... or Q.. (see "Further designs")		7			
Non-wetted parts materials					
• Stainless steel, deep-drawn and electrolytically polished		4			
Version					
• Standard versions		1			
Explosion protection					
• None		A			
• With ATEX, Type of protection: - "Intrinsic safety (Ex ia)"		B			
• Zone 20/21/22 ⁴⁾		C			
• Ex nA/nL (Zone 2) ⁵⁾		E			
• with FM "intrinsic safety" (cFM _{US})		M			
Electrical connection / cable entry					
• Screwed gland M20x1.5 (polyamide) ⁶⁾		A			
• Screwed gland M20x1.5 (metal)		B			
• Screwed gland M20x1.5 (stainless steel)		C			
• M12 connectors (without cable socket)		F			
• M12 connectors (stainless steel), without cable socket		G			
• Screwed gland ½-14 NPT metal thread ⁷⁾		H			
• Screwed gland ½-14 NPT stainless steel thread ⁷⁾		J			

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Selection and Ordering data	Order code	HART	PA	FF
Further designs				
Add "-Z" to Article No. and specify Order code.				
Pressure transmitter with mounting bracket (2 shackles, 4 nuts, 4 U-plates, 1 angle) made of: made completely of stainless steel, for wall or pipe mounting	A02	✓	✓	✓
Cable socket for M12 plug • Stainless steel	A51		✓	✓
Rating plate inscription (instead of English)				
• German	B10	✓	✓	✓
• French	B12	✓	✓	✓
• Spanish	B13	✓	✓	✓
• Italian	B14	✓	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	B21	✓	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2¹	C11	✓	✓	✓
Inspection certificate² Acc. to EN 10204-3.1	C12	✓	✓	✓
Factory certificate Acc. to EN 10204-2.2	C14	✓	✓	✓
Degree of protection IP65/IP68 (only for M20x1.5 and ½-14 NPT)	D12	✓	✓	✓
Degree of protection IP6k9k (only for M20x1.5)	D46	✓	✓	✓
Export approval Korea	E11	✓	✓	✓
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF8...-.....-B..)	E45	✓	✓	✓
Ex Approval Ex ia/ib NEPSI	E55	✓	✓	✓
Only for SITRANS P300 with front-flush diaphragm (7MF81...-...)				
Flange to EN 1092-1, Form B1				
• DN 25, PN 40 ³	M11	✓	✓	✓
• DN 25, PN 100 ⁴	M21	✓	✓	✓
• DN 40, PN 40	M13	✓	✓	✓
• DN 40, PN 100	M23	✓	✓	✓
• DN 50, PN 16	M04	✓	✓	✓
• DN 50, PN 40	M14	✓	✓	✓
• DN 80, PN 16	M06	✓	✓	✓
• DN 80, PN 40	M16	✓	✓	✓
Flanges to ASME B16.5				
• 1", class 150 ⁴	M40	✓	✓	✓
• 1½", class 150	M41	✓	✓	✓
• 2", class 150	M42	✓	✓	✓
• 3", class 150	M43	✓	✓	✓
• 4", class 150	M44	✓	✓	✓
• 1", class 300 ⁴	M45	✓	✓	✓
• 1½", class 300	M46	✓	✓	✓
• 2", class 300	M47	✓	✓	✓
• 3", class 300	M48	✓	✓	✓
• 4", class 300	M49	✓	✓	✓
Threaded connector to DIN 3852-2, form A, thread to ISO 228				
• G ¾"-A, front-flush ⁴	R01	✓	✓	✓
• G 1"-A, front-flush ⁴	R02	✓	✓	✓
• G 2"-A, front-flush ⁴	R04	✓	✓	✓
Tank connection⁵ Sealing is included in delivery				
• TG 52/50, PN 40	R10	✓	✓	✓
• TG 52/150, PN 40	R11	✓	✓	✓

Selection and Ordering data	Order code	HART	PA	FF
Further designs				
Add "-Z" to Article No. and specify Order code.				
Sanitary process connection according DIN 11851 (Dairy connection with slotted union nut) Certified to 3A ⁶				
• DN 50, PN 25	N04	✓	✓	✓
• DN 80, PN 25	N06	✓	✓	✓
Tri-Clamp connection according DIN 32676/ISO 2852 Certified to 3A ⁶				
• DN 50/2", PN 16	N14	✓	✓	✓
• DN 65/3", PN 10	N15	✓	✓	✓
Varivent connection Certified to 3A and EHEDG ⁶				
• Type N = 68 for Varivent housing DN 40 ... 125 und 1½" ... 6", PN 40	N28	✓	✓	✓
Temperature decoupler up to 200 °C⁷ for front-flush diaphragm version	P00	✓	✓	✓
Temperature decoupler up to 250 °C Measuring cell filling: High-temperature oil (Silicone oil)	P10	✓	✓	✓
Bio-Control sanitary process connection Certified to 3A and EHEDG ⁶				
• DN 50, PN 16	Q53	✓	✓	✓
• DN 65, PN 16	Q54	✓	✓	✓
Sanitary process connection to DRD • DN 50, PN 40	M32	✓	✓	✓
SMS socket with union nut				
• 2"	M67	✓	✓	✓
• 2½"	M68	✓	✓	✓
• 3"	M69	✓	✓	✓
SMS threaded socket				
• 2"	M73	✓	✓	✓
• 2½"	M74	✓	✓	✓
• 3"	M75	✓	✓	✓
IDF socket with union nut ISO 2853				
• 2"	M82	✓	✓	✓
• 2½"	M83	✓	✓	✓
• 3"	M84	✓	✓	✓
IDF threaded socket ISO 2853				
• 2"	M92	✓	✓	✓
• 2½"	M93	✓	✓	✓
• 3"	M94	✓	✓	✓
Sanitary process connection to NEUMO Bio-Connect screw connection Certified to 3A and EHEDG ⁶				
• DN 50, PN 16	Q05	✓	✓	✓
• DN 65, PN 16	Q06	✓	✓	✓
• DN 80, PN 16	Q07	✓	✓	✓
• DN 100, PN 16	Q08	✓	✓	✓
• DN 2", PN 16	Q13	✓	✓	✓
• DN 2½", PN 16	Q14	✓	✓	✓
• DN 3", PN 16	Q15	✓	✓	✓
• DN 4", PN 16	Q16	✓	✓	✓
Sanitary process connection to NEUMO Bio-Connect flange connection Certified to 3A and EHEDG ⁶				
• DN 50, PN 16	Q23	✓	✓	✓
• DN 65, PN 16	Q24	✓	✓	✓
• DN 80, PN 16	Q25	✓	✓	✓
• DN 100, PN 16	Q26	✓	✓	✓
• DN 2", PN 16	Q31	✓	✓	✓
• DN 2½", PN 16	Q32	✓	✓	✓
• DN 3", PN 16	Q33	✓	✓	✓
• DN 4", PN 16	Q34	✓	✓	✓

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

1

Selection and Ordering data	Order code			
Further designs		HART	PA	FF
Add "-Z" to Article No. and specify Order code.				
Sanitary process connection to NEUMO Bio-Connect clamp connection Certified to 3A and EHEDG ⁶⁾				
• DN 50, PN 16	Q39	✓	✓	✓
• DN 65, PN 10	Q40	✓	✓	✓
• DN 80, PN10	Q41	✓	✓	✓
• DN 100, PN 10	Q42	✓	✓	✓
• DN 2½", PN 16	Q48	✓	✓	✓
• DN 3", PN 10	Q49	✓	✓	✓
• DN 4", PN 10	Q50	✓	✓	✓
Sanitary process connection to NEUMO Bio-Connect S flange connection Certified to 3A and EHEDG				
• DN 2", PN 16	Q72	✓	✓	✓
Aseptic threaded socket to DIN 11864-1 Form A Certified to 3A and EHEDG				
• DN 50, PN 25	N33	✓	✓	✓
• DN 65, PN 25	N34	✓	✓	✓
• DN 80, PN 25	N35	✓	✓	✓
• DN 100, PN 25	N36	✓	✓	✓
Aseptic flange with notch to DIN 11864-2 Form A Certified to 3A and EHEDG				
• DN 50, PN 16	N43	✓	✓	✓
• DN 65, PN 16	N44	✓	✓	✓
• DN 80, PN 16	N45	✓	✓	✓
• DN 100, PN 16	N46	✓	✓	✓
Aseptic flange with groove to DIN 11864-3 Form A Certified to 3A and EHEDG				
• DN 50, PN 16	N43 + P11	✓	✓	✓
• DN 65, PN 16	N44 + P11	✓	✓	✓
• DN 80, PN 16	N45 + P11	✓	✓	✓
• DN 100, PN 16	N46 + P11	✓	✓	✓
Aseptic clamp with groove to DIN 11864-3 FormA Certified to 3A and EHEDG				
• DN 50, PN 25	N53	✓	✓	✓
• DN 65, PN 25	N54	✓	✓	✓
• DN 80, PN 16	N55	✓	✓	✓
• DN 100, PN 16	N56	✓	✓	✓

Selection and Ordering data	Order code			
Additional data		HART	PA	FF
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ ⁸⁾	
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 characters, specify in plain text: Y16:	Y16	✓	✓	✓
Entry of HART TAG Max. 8 characters, specify in plain text: Y17:	Y17	✓		
Setting of the display in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O ¹⁾ , inH ₂ O ¹⁾ , ftH ₂ O ¹⁾ , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or %) ref. temperature 20 °C	Y21	✓	✓	✓
Setting of the display in non-pressure units³⁾ Specify in plain text: Y22: up to l, m ³ , m, USg, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	Y22 + Y01	✓		
Preset bus address (possible between 1 ... 126) Specify in plain text: Y25:	Y25		✓	✓

Factory mounting of valve manifolds, see accessories.

Only Y01, Y15, Y16, Y17, Y21, Y22 and Y25 can be factory preset

✓ = available

Ordering example

Item line: 7MF8023-1DB24-1AB7-Z
 B line: A02 + Y01 + Y21
 C line: Y01: 1 ... 10 bar (14.5 ... 145 psi)
 C line: Y21: bar (psi)

¹⁾ When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.

²⁾ If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.

³⁾ Special seal in Viton included in the scope of delivery

⁴⁾ Cannot be combined with Order codes P00 and P10. Can only be ordered with silicone oil measuring cell filling.

⁵⁾ The weldable socket can be ordered under accessories.

⁶⁾ 3A certification only if used in conjunction with 3A-compliant sealing rings.

⁷⁾ Certified to 3A and EHEDG. The maximum permissible temperatures of the medium depend on the respective cell fillings (see medium conditions).

⁸⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

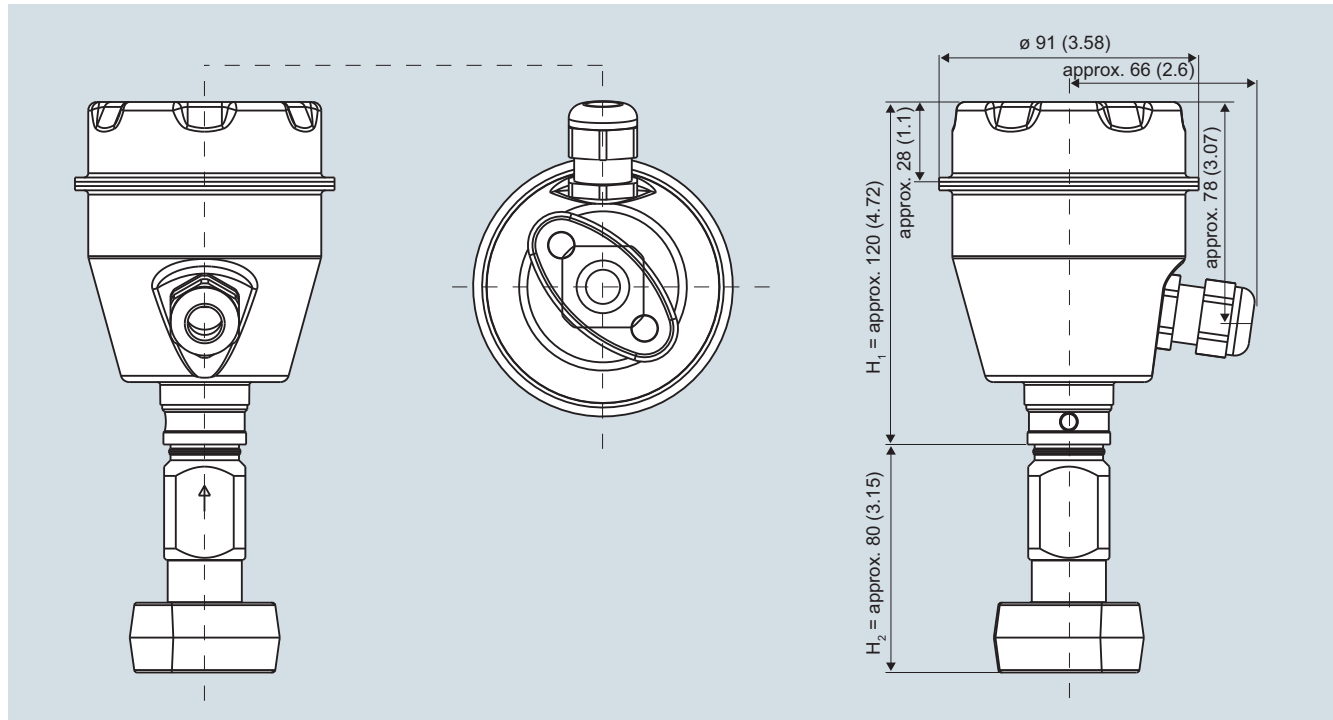
⁹⁾ Preset values can only be changed over SIMATIC PDM.

Pressure Measurement

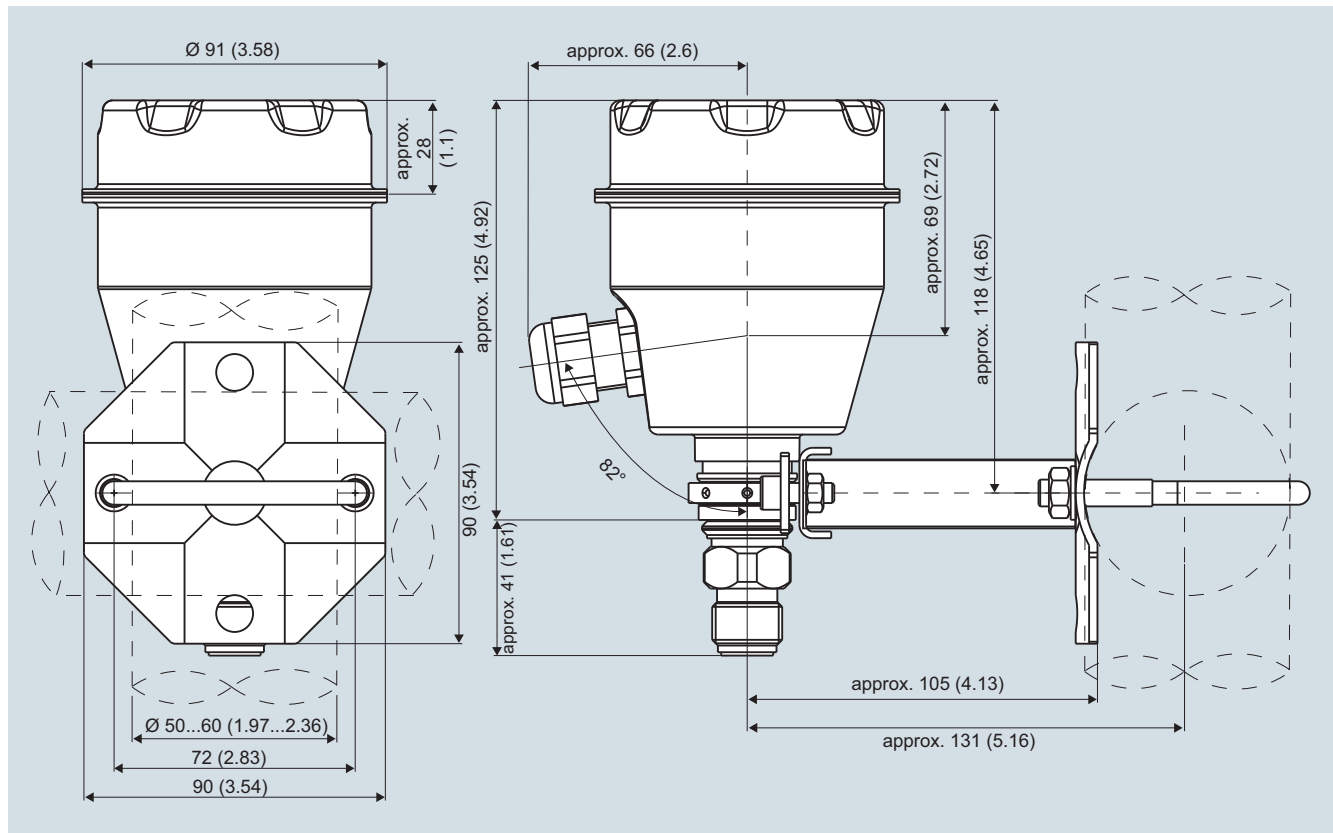
Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Dimensional drawings



SITRANS P300, with oval flange, dimensions in mm (inch)



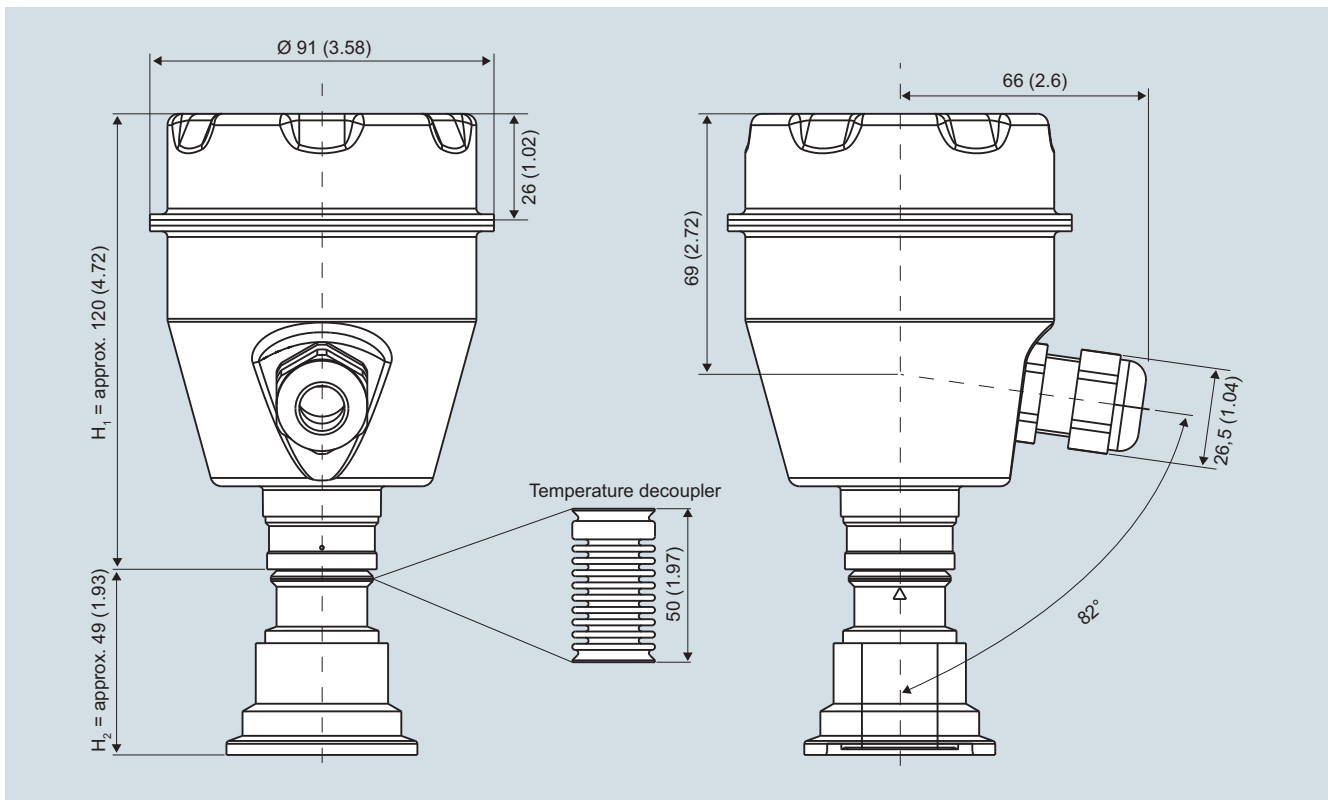
SITRANS P300, process connection M20 x 1.5, with mounted mounting bracket, dimensions in mm (inch)

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

1



SITRANS P300, front-flush, dimensions in mm (inch)

The diagram shows a SITRANS P300 with an example of a flange. In this drawing the height is subdivided into H_1 and H_2 .

H_1 = Height of the SITRANS P300 up to a defined cross-section

H_2 = Height of the flange up to this defined cross-section

Only the height H_2 is indicated in the dimensions of the flanges.

Pressure Measurement

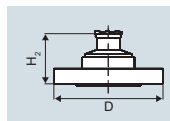
Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

Flanges as per EN and ASME

Flange to EN

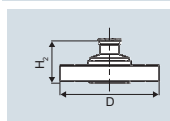
EN 1092-1



Order code	DN	PN	ØD	H ₂
M11	25	40	115 mm (4.5")	Approx. 52 mm (2")
M21	25	100	140 mm (5.5")	
M13	40	40	150 mm (5.9")	
M23	40	100	170 mm (6.7")	
M04	50	16	165 mm (6.5")	
M14	50	40	165 mm (6.5")	
M06	80	16	200 mm (7.9")	
M16	80	40	200 mm (7.9")	

Flanges to ASME

ASME B16.5

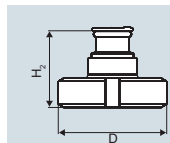


Order code	DN	PN	ØD	H ₂
M40	1"	150	110 mm (4.3")	Approx. 52 mm (2")
M41	1½"	150	130 mm (5.1")	
M42	2"	150	150 mm (5.9")	
M43	3"	150	190 mm (7.5")	
M44	4"	150	230 mm (9.1")	
M45	1"	300	125 mm (4.9")	
M46	1½"	300	155 mm (6.1")	
M47	2"	300	165 mm (6.5")	
M48	3"	300	210 mm (8.1")	
M49	4"	300	255 mm (10.0")	

NuG and pharmaceutical connections

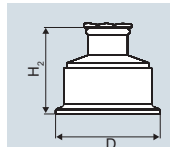
Connections to DIN

DIN 11851 (milk pipe union with slotted union nut)



Order code	DN	PN	ØD	H ₂
N04	50	25	92 mm (3.6")	Approx. 52 mm (2")
N06	80	25	127 mm (5.0")	

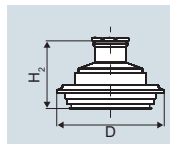
Tri-Clamp nach DIN 32676



Order code	DN	PN	ØD	H ₂
N14	50	16	64 mm (2.5")	Approx. 52 mm (2")
N15	65	10	91 mm (3.6")	

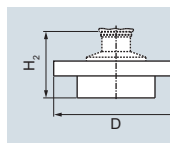
Other connections

Varivent connection



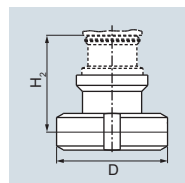
Order code	DN	PN	ØD	H ₂
N28	40 ... 125	40	84 mm (3.3")	Approx. 52 mm (2")

Sanitary process connection to DRD



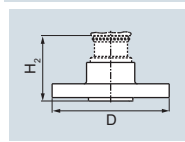
Order code	DN	PN	ØD	H ₂
M32	50	40	105 mm (4.1")	Approx. 52 mm (2")

Sanitary process screw connection to NEUMO Bio-Connect



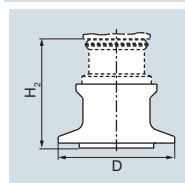
Order code	DN	PN	ØD	H ₂
Q05	50	16	82 mm (3.2")	Approx. 52 mm (2")
Q06	65	16	105 mm (4.1")	
Q07	80	16	115 mm (4.5")	
Q08	100	16	145 mm (5.7")	
Q13	2"	16	82 mm (3.2")	
Q14	2½"	16	105 mm (4.1")	
Q15	3"	16	105 mm (4.1")	
Q16	4"	16	145 mm (5.7")	

Sanitary process connection to NEUMO Bio-Connect flange connection



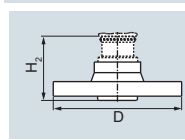
Order code	DN	PN	ØD	H ₂
Q23	50	16	110 mm (4.3")	Approx. 52 mm (2")
Q24	65	16	140 mm (5.5")	
Q25	80	16	150 mm (5.9")	
Q26	100	16	175 mm (6.9")	
Q31	2"	16	100 mm (3.9")	
Q32	2½"	16	110 mm (4.3")	
Q33	3"	16	140 mm (5.5")	
Q34	4"	16	175 mm (6.9")	

Sanitary process connection to NEUMO Bio-Connect clamp connection



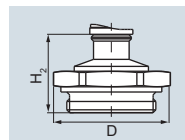
Order code	DN	PN	ØD	H ₂
Q39	50	16	77.4 mm (3.0")	Approx. 52 mm (2")
Q40	65	10	90.9 mm (3.6")	
Q41	80	10	106 mm (4.2")	
Q42	100	10	119 mm (4.7")	
Q47	2"	16	77.4 mm (3.0")	
Q48	2½"	16	90.9 mm (3.6")	
Q49	3"	10	106 mm (4.2")	
Q50	4"	10	119 mm (4.7")	

Sanitary process connection to NEUMO Bio-Connect S flange connection



Order code	DN	PN	ØD	H ₂
Q72	2"	16	125 mm (4.9")	Approx. 52 mm (2")

Threaded connection G¾", G1" and G2" acc. to DIN 3852



Order code	DN	PN	ØD	H ₂
R01	¾"	60	37 mm (1.5")	Approx. 45 mm (1.8")
R02	1"	60	48 mm (1.9")	Approx. 47 mm (1.9")
R04	2"	60	78 mm (3.1")	Approx. 52 mm (2")

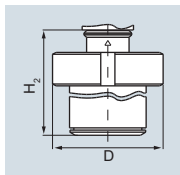
Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 for gauge and absolute pressure

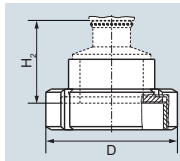
1

Tank connection TG 52/50 and TG52/150



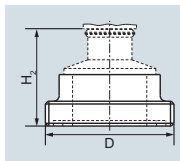
Order code	DN	PN	ØD	H ₂
R10	25	40	63 mm (2.5")	Approx. 63 mm (2.5")
R11	25	40	63 mm (2.5")	Approx. 170 mm (6.7")

SMS socket with union nut



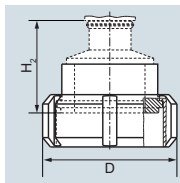
Order code	DN	PN	ØD	H ₂
M67	2"	25	84 mm (3.3")	Approx. 52 mm (2")
M68	2½"	25	100 mm (3.9")	
M69	3"	25	114 mm (4.5")	

SMS threaded socket



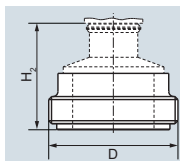
Order code	DN	PN	ØD	H ₂
M73	2"	25	70 x 1/6 mm	Approx. 52 mm (2")
M74	2½"	25	85 x 1/6 mm	
M75	3"	25	98 x 1/6 mm	

IDF socket with union nut



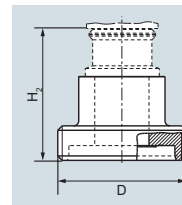
Order code	DN	PN	ØD	H ₂
M82	2"	25	77 mm (3")	Approx. 52 mm (2")
M83	2½"	25	91 mm (3.6")	
M84	3"	25	106 mm (4.2")	

IDF threaded socket



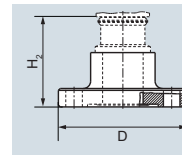
Order code	DN	PN	ØD	H ₂
M92	2"	25	64 mm (2.5")	Approx. 52 mm (2")
M93	2½"	25	77.5 mm (3.1")	
M94	3"	25	91 mm (3.6")	

Aseptic threaded socket to DIN 11864-1 Form A



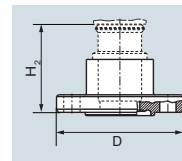
Order code	DN	PN	ØD	H ₂
N33	50	25	78 x 1/6"	Approx. 52 mm (2")
N34	65	25	95 x 1/6"	
N35	80	25	110 x 1/4"	
N36	100	25	130 x 1/4"	

Aseptic flange with notch to DIN 11864-2 Form A



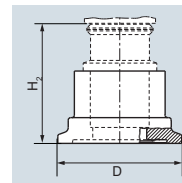
Order code	DN	PN	ØD	H ₂
N43	50	16	94	Approx. 52 mm (2")
N44	65	16	113	
N45	80	16	133	
N46	100	16	159	

Aseptic flange with groove to DIN 11864-2 Form A



Order code	DN	PN	ØD	H ₂
N43 + P11	50	16	94	Approx. 52 mm (2")
N44 + P11	65	16	113	
N45 + P11	80	16	133	
N46 + P11	100	16	159	

Aseptic clamp with groove to DIN 11864-3 Form A



Order code	DN	PN	ØD	H ₂
N53	50	25	77.5	Approx. 52 mm (2")
N54	65	25	91	
N55	80	16	106	
N56	100	16	130	

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 Accessories/Spare parts

Selection and Ordering data	Article No.
<i>Spare parts / Accessories</i>	
Mounting bracket and fastening parts kit made of stainless steel	7MF8997-1AA
Lid without window gasket not included	7MF8997-1BA
Lid with glass window gasket not included	7MF8997-1BD
NBR enclosure sealing	7MF8997-1BG
Measuring point label unlabeled	7MF8997-1CA
Cable gland • metal • plastic (blue)	7MF8997-1EA 7MF8997-1EB
Weldable sockets for PMC connection • PMC Style Standard: Thread 1½" • PMC Style Minibolt: front-flush 1"	7MF4997-2HA 7MF4997-2HB
Gaskets for PMC connection (packing unit = 5 units) • PTFE seal for PMC Style Standard: Thread 1½" • Gasket made of Viton for PMC Style Minibolt: front-flush 1"	7MF4997-2HC 7MF4997-2HD
Weldable socket for TG 52/50 and TG 52/150 connection • TG 52/50 connection • TG5 2/150 connection	7MF4997-2HE 7MF4997-2HF
Seals for TG 52/50 and TG 52/150 made of silicone	7MF4997-2HG
Seals for flange connection with front-flush diaphragm Material FPM (Viton), 10 units • DN 25, PN 40 (M11) • DN 25, PN 100 (M21) • 1", class 150 (M40) • 1", class 300 (M45)	7MF4997-2HH 7MF4997-2HJ 7MF4997-2HK 7MF4997-2HL

Selection and Ordering data	Article No.
Operating Instructions¹⁾ • for SITRANS P300 series with HART - German - English - French - Spanish - Italian - Leporello German/English • for SITRANS P300 series with PROFIBUS PA - German - English - French - Spanish - Italian - Leporello German/English	A5E00359580 A5E00359579 A5E00359578 A5E00359576 A5E00359577 A5E00359581 A5E00414587 A5E00414588 A5E00414589 A5E00414590 A5E00414591 A5E00414592
Compact operating instructions • English, german, spanish, french, italian, dutch • English, estonian, latvian, lithuanian, polish, romanian • English, bulgarian, czech, finnish, slovakian, slovenian • English, danish, greek, portuguese, swedish, hungarian • Korean The compact operating instructions are available in 21 EU languages on the product CD supplied with each transmitter. They can also be downloaded from the SITRANS P web page.	A5E03434626 A5E03434631 A5E03434645 A5E03434656 A5E03693760
Brief instructions (Leporello) • for SITRANS P300 with HART - German/English • for SITRANS P300 with PROFIBUS PA - German/English • for SITRANS P300 with FOUNDATION Fieldbus - German/English	A5E00359581 A5E00414592 A5E01176733
CD with SITRANS P documentation • German, English, French, Spanish, Italian including compact operating instructions in 21 EU languages	A5E00090345
Certificates (order only via SAP) instead of Internet download • hard copy (to order) • on CD (to order)	A5E03252406 A5E03252407
HART modem with USB interface ▶ Available ex stock	7MF4997-1DB

Power supply units see Chap. 7 "Supplementary Components".

¹⁾ You can download these operating instructions free-of-charge from our Internet site at www.siemens.com/sitransp.

Overview

The SITRANS P300 transmitter for gauge and absolute pressure can be delivered factory-fitted with the following valve manifolds:

- 7MF9011-4EA and 7MF9011-4FA valve manifolds for gauge pressure and absolute pressure transmitters

Design

The 7MF9011-4EA valve manifolds are sealed with gaskets made of PTFE between transmitter and the valve manifold as standard. Soft iron, stainless steel and copper gaskets are also available for sealing purposes if preferred.

The 7MF9011-4FA valve manifolds are sealed with PTFE sealing tape between the transmitter and the valve manifold.

Once installed, the complete unit is checked under pressure for leaks (compressed air 6 bar (87 psi)) and is certified leak-proof with a test report to EN 10204 - 2.2.

All valve manifolds should preferably be secured with the respective mounting brackets. The transmitters are mounted on the valve manifold and not on the unit itself.

If you order a mounting bracket when choosing the option "Factory mounting of valve manifolds", you will receive a mounting bracket for the valve manifold instead of a bracket for mounting the transmitter.

If you order an acceptance test certificate 3.1 to EN 10204 when choosing the option "Factory mounting of valve manifolds", a separate certificate is provided for the transmitters and the valve manifolds respectively.

Selection and Ordering data**7MF9011-4FA valve manifold on gauge and absolute pressure transmitters**

Add **-Z** to the Article No. of the transmitter and add Order codes

SITRANS P300
7MF802-...1.-...

With process connection female thread 1/2-14 NPT in-sealed with PTFE sealing tape

Delivery incl. high-pressure test certified by test report to EN 10204-2.2

Further designs:

Delivery includes mounting brackets and mounting clips made of stainless steel (instead of the mounting bracket supplied with the transmitter)

Supplied acceptance test certificate to EN 10204- 3.1 for transmitters and mounted valve manifold

T03**A02****C12****7MF9011-4EA valve manifold on gauge and absolute pressure transmitters**

Add **-Z** to the Article No. of the transmitter and add Order codes

SITRANS P300
7MF802-...0.-...

with process connection collar G1/2 A to EN 837-1 with gasket made of PTFE between valve manifold and transmitter

Alternative sealing material:

- Soft iron
- Stainless steel, Mat. No. 14571
- copper

Delivery incl. high-pressure test certified by test report to EN 10204-2.2

Further designs:

Delivery includes mounting brackets and mounting clips made of stainless steel (instead of the mounting bracket supplied with the transmitter)

Supplied acceptance test certificate to EN 10204- 3.1 for transmitters and mounted valve manifold

T02**A70****A71****A72****A02****C12**

Pressure Measurement

Transmitters for food, pharmaceuticals and biotechnology

SITRANS P300 - Factory-mounting of valve manifolds on transmitters

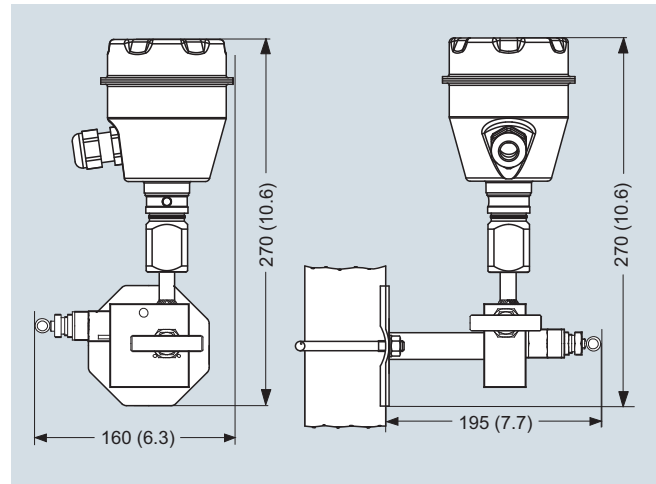
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Dimensional drawings

Valve manifolds mounted on SITRANS P300



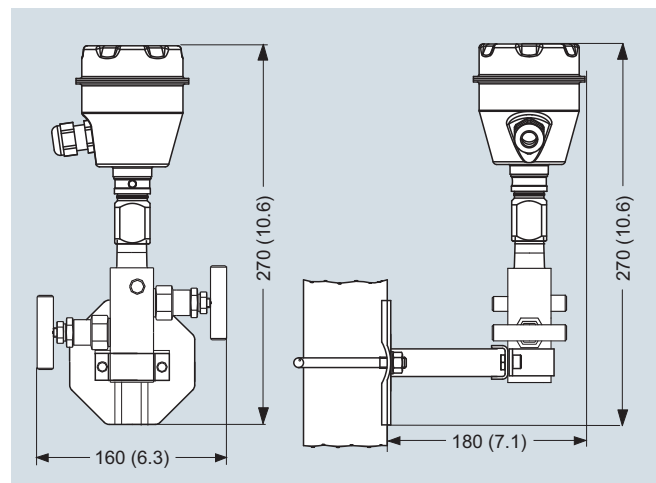
7MF9011-4EA valve manifold with mounted gauge pressure and absolute pressure transmitters



7MF9011-4EA valve manifold with mounted gauge pressure and absolute pressure transmitters, dimensions in mm (inch)

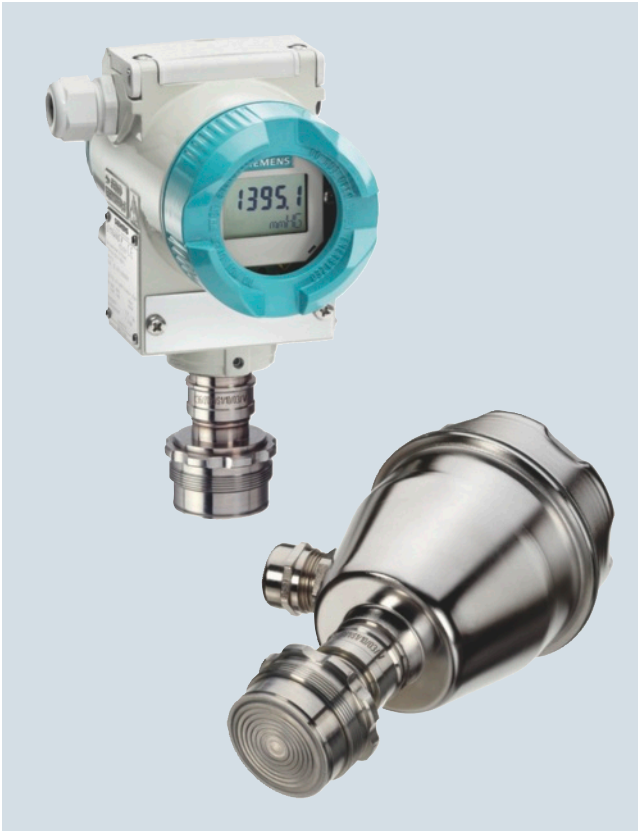


7MF9011-4FA valve manifold with mounted gauge pressure and absolute pressure transmitters



7MF9011-4FA valve manifold with mounted gauge pressure and absolute pressure transmitters, dimensions in mm (inch)

Overview



The SITRANS P300 and DS III pressure transmitters have been fitted with special process connections for the paper industry. With the two process connection threads 1½" and 1" flush at the front, the SITRANS P300 and DS III transmitters can be used for all processes in the paper industry.

SITRANS P300 and SITRANS PDS III series pressure transmitters are digital pressure transmitters featuring extensive user-friendliness and high accuracy. The parameterization is performed using control keys via HART, PROFIBUS-PA or FOUNDATION Fieldbus interface.

Extensive functionality enables the pressure transmitter to be precisely adapted to the plant's requirements. Operation is very simple in spite of the numerous setting options.

Transmitters with type of protection "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The transmitters are provided with an EC type examination certificate and comply with the corresponding harmonized European standards (ATEX).

Various versions of the pressure transmitters are available for measuring:

- Gauge pressure
- Level
- Mass level
- Volume level

Benefits

- High quality and service life
- High reliability even under extreme chemical and mechanical loads, e.g. abrasion.
- For aggressive and non-aggressive gases, vapors and liquids
- Extensive diagnosis and simulation functions
- Minimum conformity error
- Small long-term drift
- Wetted parts made of Hastelloy
- Infinitely adjustable span from 0.03 bar to 16 bar (0.43 psi to 232 psi) for DS III with HART interface
- Nominal measuring range from 1 bar to 16 bar (14.5 psi to 232 psi) for DS III with PROFIBUS PA and FOUNDATION Fieldbus interface
- Infinitely adjustable span from 0.03 bar to 16 bar (0.43 psi to 232 psi) for SITRANS P300 with HART interface
- Nominal measuring range from 1 bar to 16 bar (14.5 psi to 232 psi) for SITRANS P300 with PROFIBUS PA interface
- High measuring accuracy
- Parameterization over control keys and HART Communication, or over PROFIBUS PA or FOUNDATION Fieldbus interface (DS III only).

Application

The pressure transmitters of the DS III series, can be used in industrial areas with extreme chemical and mechanical loads. Electromagnetic compatibility in the range 10 kHz to 1 GHz makes the DS III pressure transmitters suitable for locations with high electromagnetic emissions.

Pressure transmitters with type of protection "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The pressure transmitters are provided with an EC type examination certificate and comply with the corresponding harmonized European standards (ATEX).

Pressure transmitters with the type of protection "Intrinsic safety" for use in zone 0 may be operated with power supply units of category "ia" and "ib".

The transmitters can be equipped with various designs of remote seals for special applications such as the measurement of highly viscous substances.

The pressure transmitter can be operated locally over 3 control keys or programmed externally over HART or over PROFIBUS-PA or FOUNDATION Fieldbus interface (only DS III).

SITRANS P, DS III series

Measured variable: Gauge pressure of aggressive and non-aggressive gases, vapors and liquids.

Span (infinitely adjustable)

For DS III with HART: 0.03 ... 16 bar (0.433 ... 232 psi)

Nominal measuring range

For DS III with PROFIBUS PA or FOUNDATION Fieldbus: 1 ... 16 bar (14.5 ... 232 psi)

SITRANS P300

Span (infinitely adjustable)

For DS III with HART: 0.03 ... 16 bar (0.433 ... 232 psi)

Nominal measuring range

For DS III with PROFIBUS PA or FOUNDATION Fieldbus: 1 ... 16 bar (14.5 ... 232 psi)

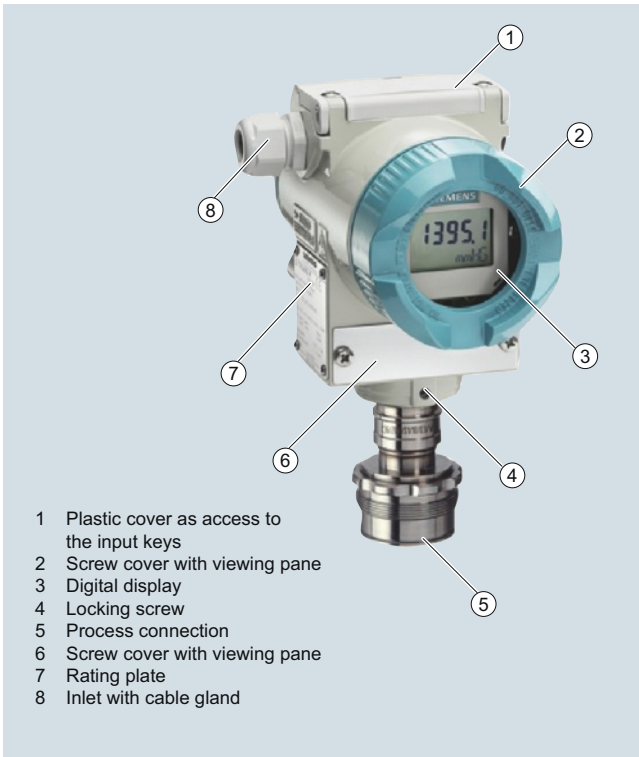
Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III and P300 with PMC connection - Technical description

Design

SITRANS P DS III



- 1 Plastic cover as access to the input keys
- 2 Screw cover with viewing pane
- 3 Digital display
- 4 Locking screw
- 5 Process connection
- 6 Screw cover with viewing pane
- 7 Rating plate
- 8 Inlet with cable gland

Device front view, SITRANS P DS III

The transmitter consists of various components depending on the order. The possible versions are listed in the ordering information. The components described below are the same for all transmitters.

The rating plate (7, Figure "Device front view) with the Article No. is located on the side of the housing. The specified number together with the ordering information provide details on the optional design details and on the possible measuring range (physical properties of built-in sensor element).

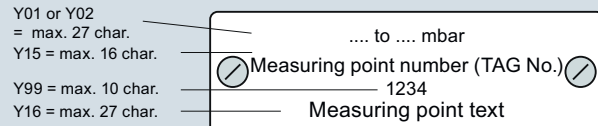
The approval label is located on the opposite side.

The housing is made of die-cast aluminium or stainless steel precision casting. A round cover is screwed on at the front and rear of the housing. The front cover (2) can be fitted with a viewing pane so that the measured values can be read directly on the display. The inlet (8) for the electrical connection is located either on the left or right side. The unused opening on the opposite side is sealed by a blanking plug. The protective earth connection is located on the rear of the housing.

The electrical connections for the power supply and screen are accessible by unscrewing the rear cover. The bottom part of the housing contains the measuring cell with process connection (5). The measuring cell is prevented from rotating by a locking screw (4). As the result of this modular design, the measuring cell and the electronics can be replaced separately from each other. The set parameter data are retained.

At the top of the housing is a plastic cover (1), which hides the input keys.

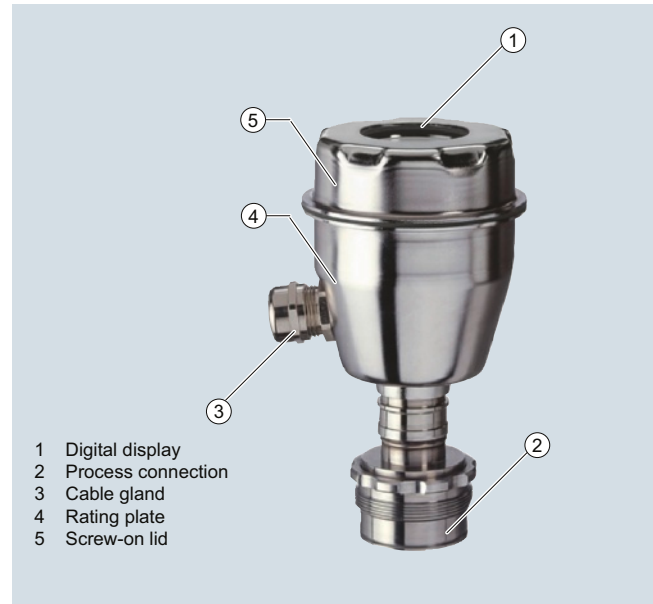
Example for an attached measuring point label



SITRANS P300

The device comprises:

- Electronics
- Housing
- Measuring cell

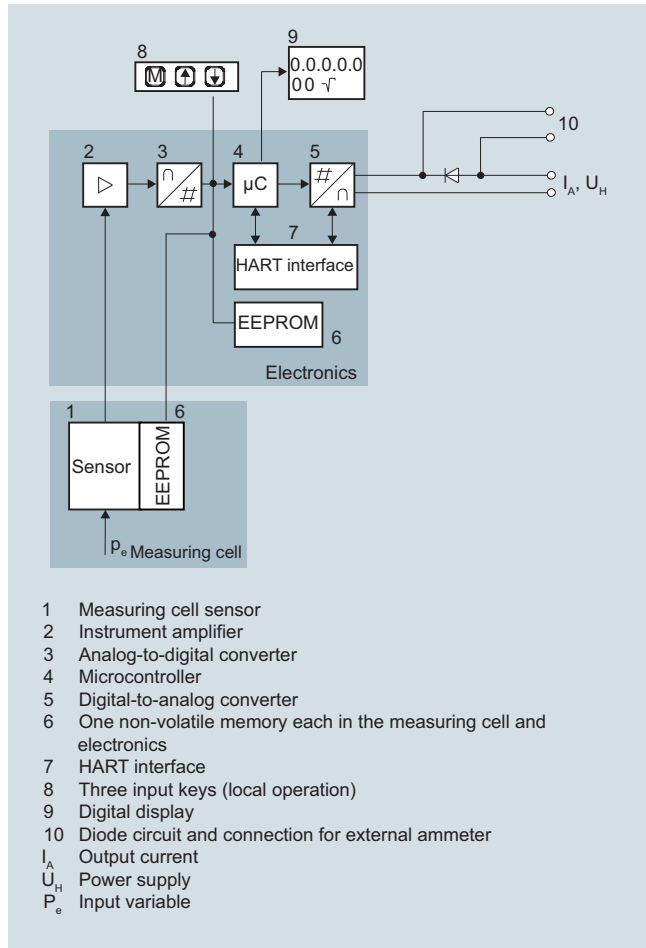


Perspective view of the SITRANS P300

The housing has a screw-on lid (5) and, depending on the version, is with or without an inspection window. The electrical terminal housing, the buttons for operation of the device are located under this lid and, depending on the version, the display. The connections for the auxiliary power UH and the shield are in the terminal housing. The cable gland is on the side of the housing. The measuring cell with the process connection (2) is located on the bottom of the housing. The measuring cell with the process connection may differ from the one shown in the diagram, depending on the device version.

Function

Operation of electronics with HART communication



Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in a microcontroller, its linearity and temperature response corrected, and converted in a digital-to-analog converter (5) into an output current of 4 to 20 mA.

The diode circuit (10) protects against incorrect polarity.

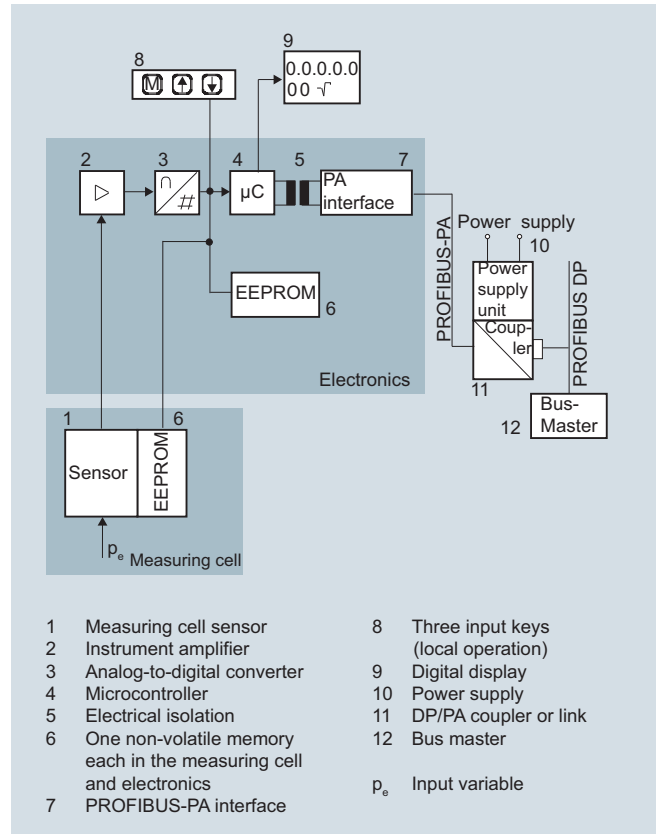
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the 3 input keys (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The HART modem (7) permits parameterization using a protocol according to the HART specification.

The pressure transmitters with spans ≤ 63 bar (914 psi) measure the input pressure compared to atmosphere, the transmitters with spans 160 bar (2320 psi) measure compared to vacuum.

Operation of electronics with PROFIBUS PA communication



Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in the microcontroller, its linearity and temperature response corrected, and provided on the PROFIBUS PA through an electrically isolated PA interface (7).

The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The first memory is linked with the measuring cell, the second with the electronics. This modular design means that the electronics and the measuring cell can be replaced separately from one another.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

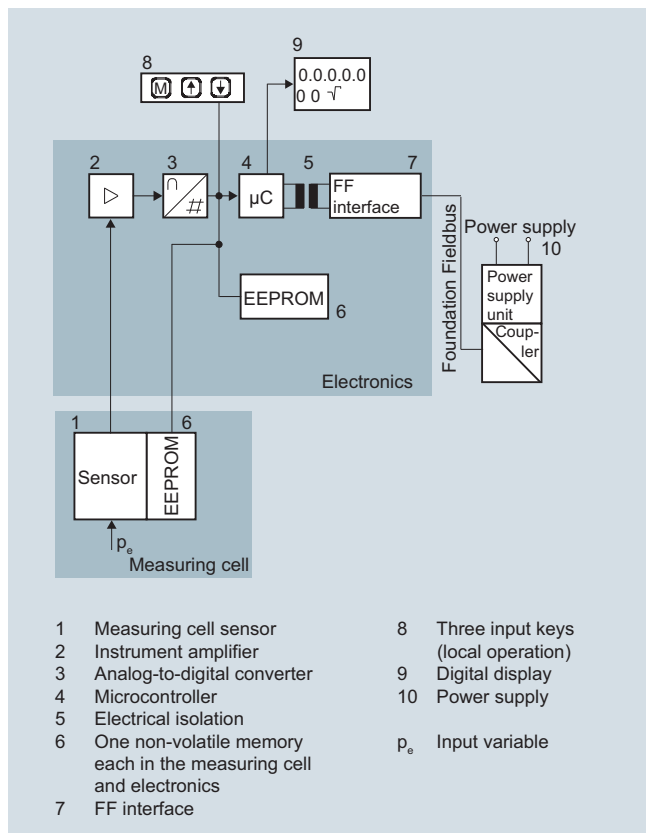
The results with status values and diagnostic values are transferred by cyclic data transmission on the PROFIBUS PA. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as SIMATIC PDM is required for this.

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III and P300 with PMC connection - Technical description

Operation of electronics with FOUNDATION Fieldbus communication



Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in the microcontroller, its linearity and temperature response corrected, and provided on the FOUNDATION Fieldbus through an electrically isolated FOUNDATION Fieldbus interface (7).

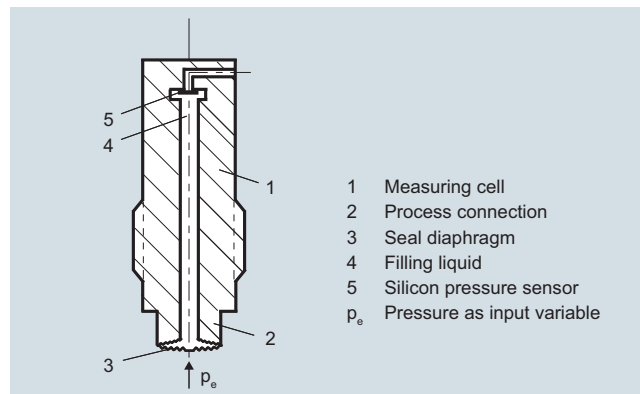
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The results with status values and diagnostic values are transferred by cyclic data transmission on the FOUNDATION Fieldbus. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as National Instruments Configurator is required for this.

Mode of operation of the measuring cell

Measuring cell for gauge pressure with front-flush diaphragm



Measuring cell for gauge pressure, with front-flush diaphragm for paper industry, function diagram

The pressure p_e is applied through the process connection (2, Figure "Measuring cell for gauge pressure, with front-flush diaphragm for paper industry, function diagram") to the measuring cell (1). This pressure is subsequently transmitted further through the seal diaphragm (3) and the filling liquid (4) to the silicon pressure sensor (5) whose measuring diaphragm is then flexed. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the absolute pressure.

Parameterization

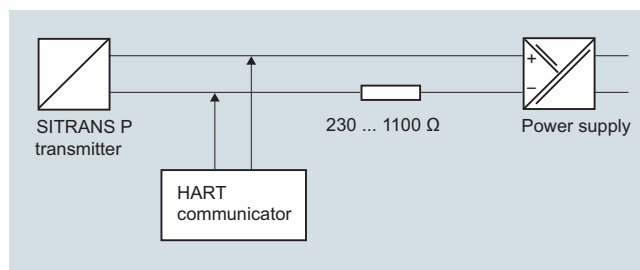
Depending on the version, there are a range of options for parameterizing the pressure transmitter and for setting or scanning the parameters.

Parameterization using the input buttons (local operation)

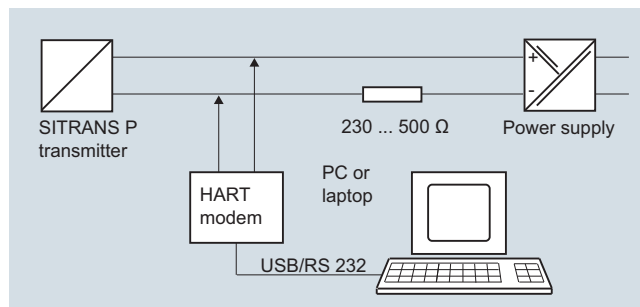
With the input buttons you can easily set the most important parameters without any additional equipment.

Parameterization using HART

Parameterization using HART is performed with a HART Communicator or a PC.



Communication between a HART Communicator and a pressure transmitter
When parameterizing with the HART Communicator, the connection is made directly to the 2-wire cable.



HART communication between a PC communicator and a pressure transmitter

When parameterizing with a PC, the connection is made through a HART modem.

The signals needed for communication in conformity with the HART 5.x or 6.x protocols are superimposed on the output current using the Frequency Shift Keying (FSK) method.

Adjustable parameter DS III with HART and P300 with HART

Parameters	Input keys	HART communication
Start of scale	x	x
Full-scale value	x	x
Electrical damping	x	x
Start-of-scale value without application of a pressure ("Blind setting")	x	x
Full-scale value without application of a pressure ("Blind setting")	x	x
Zero adjustment	x	x
current transmitter	x	x
Fault current	x	x
Disabling of buttons, write protection	x	x ¹⁾
Type of dimension and actual dimension	x	x
Characteristic (linear)	x	x
Input of characteristic		x
Freely-programmable LCD		x
Diagnostic functions		x

¹⁾ Cancel apart from write protection

Diagnostic functions for DS III with HART and P300 with HART

- Zero correction display
- Event counter
- Limit transmitter
- Saturation alarm
- Slave pointer
- Simulation functions
- Maintenance timer

Available physical units of display for DS III with HART and P300 with HART

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	Pa, MPa, kPa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , inH ₂ O, inH ₂ O (4 °C), mmH ₂ O, ftH ₂ O (20 °C), inHg, mmHg
Level (height data)	m, cm, mm, ft, in
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , US gallon, Imp. gallon, bushel, barrel, barrel liquid
Mass	g, kg, t, lb, Ston, Lton, oz
Temperature	K, °C, °F, °R
Miscellaneous	%, mA

Parameterization through PROFIBUS PA interface

Fully digital communication through PROFIBUS PA, profile 3.0, is particularly user-friendly. The PROFIBUS connects the DS III PA to a process control system, e.g. SIMATIC PSC 7. Communication is possible even in a potentially explosive environment.

For parameterization through PROFIBUS you need suitable software, e.g. SIMATIC PDM (Process Device Manager).

Parameterization through FOUNDATION Fieldbus interface

Fully digital communication through FOUNDATION Fieldbus is particularly user-friendly. Through the FOUNDATION Fieldbus the DS III with FOUNDATION Fieldbus is connected to a process control system. Communication is possible even in a potentially explosive environment.

For parameterization through the FOUNDATION Fieldbus you need suitable software, e.g. National Instruments Configurator.

Adjustable parameters for DS III with PROFIBUS PA and FOUNDATION Fieldbus, and P300 with PROFIBUS PA and FOUNDATION Fieldbus

Adjustable parameters	Input keys	PROFIBUS PA and FOUNDATION Fieldbus interface
Electrical damping	x	x
Zero adjustment (correction of position)	x	x
Buttons and/or function disabling	x	x
Source of measured-value display	x	x
Physical dimension of display	x	x
Position of decimal point	x	x
Bus address	x	x
Adjustment of characteristic	x	x
Input of characteristic		x
Freely-programmable LCD		x
Diagnostic functions		x

Diagnostic functions for DS III with PROFIBUS PA and FOUNDATION Fieldbus, and P300 with PROFIBUS PA and FOUNDATION Fieldbus

- Event counter
- Slave pointer
- Maintenance timer
- Simulation functions
- Display of zero correction
- Limit transmitter
- Saturation alarm

Physical dimensions available for the display

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	MPa, hPa, kPa, Pa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , mmH ₂ O, mmH ₂ O (4 °C), inH ₂ O, inH ₂ O (4 °C), ftH ₂ O, mmHg, inHg
Level (height data)	m, cm, mm, ft, in, yd
Mass	g, kg, t, lb, Ston, Lton, oz
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , US gallon, Imp. gallon, bushel, barrel, barrel liquid
Temperature	K, °C, °F, °R
Miscellaneous	%

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III with PMC connection

Technical specifications

SITRANS P, DS III series for gauge pressure with PMC connection for the paper industry

	HART	PROFIBUS PA and FOUNDATION Fieldbus		
Input	Gauge pressure			
Measured variable	Gauge pressure			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	0.01 ... 1 bar (0.15 ... 14.5 psi)	6 bar (87 psi)	1 bar (14.5 psi)	6 bar (87 psi)
	0.04 ... 4 bar (0.58 ... 58 psi)	10 bar (145 psi)	4 bar (58 psi)	10 bar (145 psi)
	0.16 ... 16 bar (2.32 ... 232 psi)	32 bar (464 psi)	16 bar (232 psi)	32 bar (464 psi)
Lower measuring limit	100 mbar a(1.45 psia)			
• Measuring cell with silicone oil filling	100% of max. span			
Upper measuring limit	100% of max. span			
Output				
Output signal	4 ... 20 mA	Digital PROFIBUS PA and FOUNDATION Fieldbus signal		
• Lower limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA	-		
• Upper limit (infinitely adjustable)	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA	-		
Load				
• Without HART communication	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in Ω , U_H : Power supply in V	-		
• With HART communication	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)	-		
Physical bus	-	IEC 61158-2		
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping T_{63} (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy	Acc. to IEC 60770-1			
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)			
	Span ratio $r = \text{max. span}/\text{set span}$	Nominal measuring range ratio $r = \text{nominal measuring range}/\text{set measuring range}$		
Error in measurement at limit setting incl. hysteresis and reproducibility				
• Linear characteristic				
- $r \leq 10$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq (0.0029 \cdot r + 0.071) \%$		
- $10 < r \leq 30$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq (0.0045 \cdot r + 0.071) \%$		
- $30 < r \leq 100$	$\leq (0.005 \cdot r + 0.05) \%$	$\leq (0.005 \cdot r + 0.05) \%$		
Long-term stability (temperature change $\pm 30 \text{ }^\circ\text{C}$ ($\pm 54 \text{ }^\circ\text{F}$))				
1- to 4-bar measuring cell	$\leq (0.25 \cdot r) \%$ per 5 years	$\leq (0.25 \cdot r) \%$ per 5 years		
16-bar measuring cell	$\leq (0.125 \cdot r) \%$ per 5 years	$\leq (0.125 \cdot r) \%$ per 5 years		
Influence of ambient temperature				
• at $-10 \dots +60 \text{ }^\circ\text{C}$ ($14 \dots 140 \text{ }^\circ\text{F}$)	$\leq (0.08 \cdot r + 0.1) \%^1$	$\leq (0.08 \cdot r + 0.1) \%^1$		
• at $-40 \dots -10 \text{ }^\circ\text{C}$ and $+60 \dots +85 \text{ }^\circ\text{C}$ ($-40 \dots +14 \text{ }^\circ\text{F}$ and $140 \dots 185 \text{ }^\circ\text{F}$)	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$		
Influence of the medium temperature (only with front-flush diaphragm)				
• Temperature difference between medium temperature and ambient temperature	3 mbar/10 K (1.2 inH ₂ O/10 K)			
Influence of mounting position	$\leq 0.1 \text{ mbar}$ (0.04 inH ₂ O g) per 10° inclination			
Measured Value Resolution	-	$3 \cdot 10^{-5}$ of nominal measuring range		

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III with PMC connection

1

SITRANS P, DS III series for gauge pressure with PMC connection for the paper industry		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Rated conditions		
Degree of protection to IEC 60529		IP66 (optional IP66/IP68), NEMA 4X
Temperature of medium		-40 ... +100 °C (-40 ... +212 °F)
Ambient conditions		
• Ambient temperature		-20 ... +85 °C (-4 ... +185 °F)
- Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics)		-40 ... +85 °C (-40 ... +185 °F)
• Storage temperature		-50 ... +85 °C (-58 ... +185 °F)
• Climatic class		
- Condensation		Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics
• Electromagnetic Compatibility		
- Emitted interference and interference immunity		Acc. to IEC 61326 and NAMUR NE 21
Design		
Weight (without options)		≈ 1.5 kg (≈ 3.3 lb)
Enclosure material		Low-copper die-cast aluminum, GD-AISI12 or stainless steel precision casting, mat. no. 1.4408
Wetted parts materials		
• Gasket (standard)		PTFE flat gasket
• O-ring (minibolt)		FPM (Viton) or optionally: FFKM or NBR
Measuring cell filling		Silicone oil or inert filling liquid
Process connection (standard)		Flush-mounted, 1½", PMC Standard design
Process connection (minibolt)		Flush-mounted, 1", minibolt design
Power supply U_H		
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	Supplied through bus -
Separate 24 V power supply necessary	-	No
Bus voltage		
• Not Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Basic current (max.)	-	12.5 mA
• Start-up current ≤ basic current	-	Yes
• Max. current in event of fault	-	15.5 mA
Fault disconnection electronics (FDE) available	-	Yes
Certificates and approvals		
Classification according to PED 97/23/EC		For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.064 · r + 0.08) %/28 °C (50 °F).

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III with PMC connection

HART communication		FOUNDATION Fieldbus communication	
HART communication	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0, 1, or 2 (register operating mode and reset function for metering)	• PID	1 resource block
Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping, adjustable	0 ... 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input /Output		
- Failure mode	parameterizable (last good value, substitute value, incorrect value)		
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output		
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Square-rooted characteristic for flow measurement	Yes		
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III with PMC connection

1

Selection and Ordering data		Article No.
SITRANS P pressure transmitters for gauge pressure, with PMC connection series DS III with HART		7MF4133-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell-cleaning	
Silicone oil	normal	1
Inert liquid	grease-free to cleanliness level 2	3
Measuring span (min. ... max.)		
0.01 ... 1 bar ¹⁾	(0.15 ... 14.5 psi) ¹⁾	B
0.04 ... 4 bar	(0.58 ... 58 psi)	C
0.1.6 ... 16 bar	(2.32 ... 232 psi)	D
Wetted parts materials		
Seal diaphragm	Connection shank	
Hastelloy	Stainless steel	B
Process connection		
<ul style="list-style-type: none"> • PMC Style Standard: Thread 1½" • PMC Style Minibolt: front-flush 1" (not with minimum span: 500 mbar (7.25 psi) - version "B") 		2 3
Non-wetted parts materials		
<ul style="list-style-type: none"> • Housing made of die-cast aluminium • Housing stainless steel precision casting 		0 3
Version		
<ul style="list-style-type: none"> • Standard versions • International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		1 2
Explosion protection		
<ul style="list-style-type: none"> • None • With ATEX, Type of protection: <ul style="list-style-type: none"> - "Intrinsic safety (Ex ia)" - "Explosion-proof (Ex d)"²⁾ - „Ex nA/ic (Zone 2)"³⁾ • FM + CSA intrinsic safe (is) • FM + CSA (is + ep) + Ex ia + Ex d (ATEX)⁴⁾ • With FM + CSA, Type of protection: <ul style="list-style-type: none"> - "Intrinsic Safe und Explosion Proof (is + xp)"³⁾ 		A B D E F S NC
Electrical connection / cable entry		
<ul style="list-style-type: none"> • Female thread M20 x 1.5 • Female thread ½-14 NPT • M12 connectors (stainless steel)^{5) 6)} 		B C F
Display		
<ul style="list-style-type: none"> • Without display • Without visible display (display concealed, setting: mA) • With visible display (setting: mA) • With customer-specific display (setting as specified, Order code "Y21" required) 		0 1 6 7
▶ Available ex stock		

Power supply units see Chap. 7 "Supplementary Components".

Included in delivery of the device:

- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- sealing ring

- 1) Only with "PMC Style Standard" process connection
- 2) Without cable gland, with blanking plug
- 3) Configurations with M12 connectors are only available in Ex ic.
- 4) Only in connection with IP65.
- 5) Only in connection with Ex approval A, B, E or F.
- 6) M12 delivered without cable socket

Selection and Ordering data		Article No.
SITRANS P pressure transmitter for gauge pressure, with PMC connection DS III with PROFIBUS PA (PA)		7MF4134-
DS III with FOUNDATION Fieldbus (FF)		7MF4135-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	1
Inert liquid	grease-free to cleanliness level 2	3
Nominal measuring range		
1 bar ¹⁾	(14.5 psi) ¹⁾	B
4 bar	(58 psi)	C
16 bar	(232 psi)	D
Wetted parts materials		
Seal diaphragm	Connection shank	
Hastelloy	Stainless steel	B
Process connection²⁾		
<ul style="list-style-type: none"> • PMC Style Standard: Thread 1½" • PMC Style Minibolt: front-flush 1" (minimum span: 500 mbar (7.25 psi), not available with 1-bar-measuring cell (Option B)) 		2 3
Non-wetted parts materials		
<ul style="list-style-type: none"> • Housing made of die-cast aluminium • Housing stainless steel precision casting 		0 3
Version		
<ul style="list-style-type: none"> • Standard versions • International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		1 2
Explosion protection		
<ul style="list-style-type: none"> • None • With ATEX, Type of protection: <ul style="list-style-type: none"> - "Intrinsic safety (Ex ia)" - "Explosion-proof (Ex d)"³⁾ - „Ex nA/ic (Zone 2)"⁴⁾ • FM + CSA intrinsic safe (is) • With FM + CSA, Type of protection: <ul style="list-style-type: none"> - "Intrinsic Safe und Explosion Proof (is + xp)"³⁾ 		A B D E F NC
Electrical connection / cable entry		
<ul style="list-style-type: none"> • Female thread M20 x 1.5 • Female thread ½-14 NPT • M12 connectors (stainless steel)^{5) 6)} 		B C F
Display		
<ul style="list-style-type: none"> • Without display • Without visible display (display concealed, setting: bar) • With visible display (setting: bar) • With customer-specific display (setting as specified, Order code "Y21" required) 		0 1 6 7
▶ Available ex stock		

Included in delivery of the device:

- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- sealing ring

- 1) Only with "PMC Style Standard" process connection
- 2) Sealing is included in delivery.
- 3) Without cable gland, with blanking plug
- 4) Configurations with M12 connectors are only available in Ex ic.
- 5) Only in connection with Ex approval A, B, E or F.
- 6) M12 delivered without cable socket

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III with PMC connection

1

Selection and Ordering data	Order code			
Further designs		HART	PA	FF
Add "-Z" to Article No. and specify Order code.				
Plug				
• Angled	A32	✓		
• Han 8D (metal, gray)	A33	✓		
M12 cable sockets (metal (CuZn))	A50	✓	✓	✓
Rating plate inscription (instead of German)				
• English	B11	✓	✓	✓
• French	B12	✓	✓	✓
• Spanish	B13	✓	✓	✓
• Italian	B14	✓	✓	✓
• Cyrillic (russian)	B16	✓	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	B21	✓	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	✓	✓	✓
Inspection certificate Acc. to EN 10204-3.1	C12	✓	✓	✓
Factory certificate Acc. to EN 10204-2.2	C14	✓	✓	✓
"Functional safety (SIL2)" certificate acc. to IEC 61508	C20	✓		
"Functional safety (SIL2/3)" certificate acc. to IEC 61508	C23	✓		
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request)	C99	✓	✓	✓
Output signal can be set to upper limit of 22.0mA	D05	✓	✓	✓
Degree of protection IP66/IP68 (only for M20 x 1.5 and ½-14 NPT)	D12	✓	✓	✓
Export approval Korea	E11	✓	✓	✓
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-...-B..)	E55 ¹⁾	✓	✓	✓
Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-...-D..)	E56 ¹⁾	✓	✓	✓
Ex protection "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-...-E..)	E57 ¹⁾	✓	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-...-R..)	E58 ¹⁾	✓	✓	✓
Mounting				
• Weldable sockets for standard 1½" threaded connection	P01	✓	✓	✓
• Weldable socket for minibolt connection 1" (incl. screw 5/16-18 UNC-2B and washer)	P02	✓	✓	✓

¹⁾ Option does not include ATEX approval, but instead includes only the country-specific approval.

Selection and Ordering data	Order code			
Additional data		HART	PA	FF
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ ¹⁾	
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 characters, specify in plain text: Y16:	Y16	✓	✓	✓
Entry of HART address (TAG) Max. 8 characters, specify in plain text: Y17:	Y17	✓		
Setting of pressure indication in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O ^{*)} , inH ₂ O ^{*)} , ftH ₂ O ^{*)} , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % *) ref. temperature 20 °C	Y21	✓	✓	✓
Setting of pressure indication in non-pressure units²⁾ Specify in plain text: Y22: up to l, m ³ , m, USg, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	Y22 + Y01	✓		
Preset bus address possible between 1 and 126 Max. 8 characters, specify in plain text: Y25:	Y25		✓	✓

Only "Y01" and "Y21" can be factory preset

✓ = available

ordering example

Item line: 7MF4133-1DB20-1AB7-Z
B line: C11 + Y01 + Y21
C line: Y01: 1 ... 10 bar (14.5 ... 145 psi)
C line: Y21: bar (psi)

¹⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

²⁾ Preset values can only be changed over SIMATIC PDM.

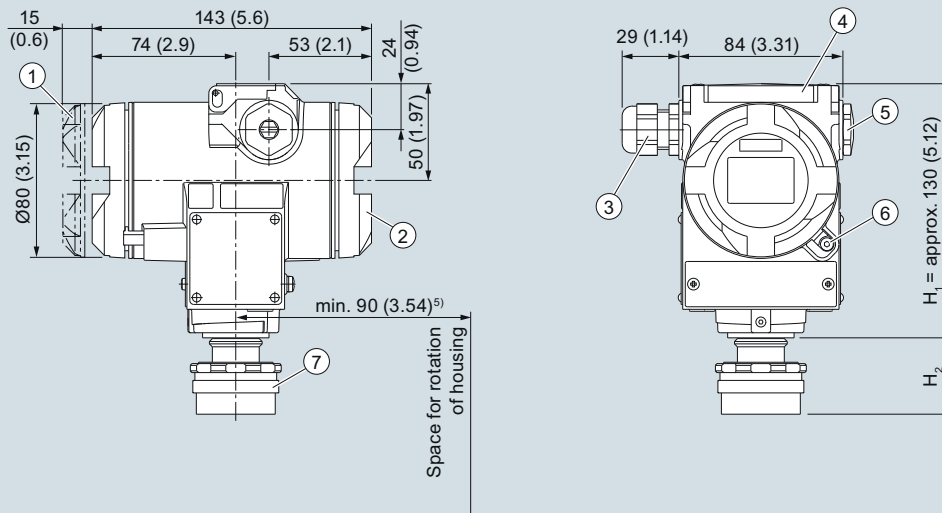
Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P DS III with PMC connection

1

Dimensional drawings



- ① Electronic side, digital display
(longer overall length for cover with window)¹⁾
- ② Terminal side¹⁾
- ③ Electrical connection:
Screwed gland M20 x 1,5 or screwed gland ½-14 NPT or
M12 connector

- ④ Protective cover over keys
- ⑤ Blanking plug
- ⑥ Screw cover - safety bracket (only for type of protection
"Explosion-proof enclosure", not shown in the drawing)
- ⑦ Process connection: PMC standard

- 1) Allow approx. 20 mm (0.79 inch) thread length to permit unscrewing
- 2) 92 mm (3.6 inch) for minimum distance to permit rotation with indicator

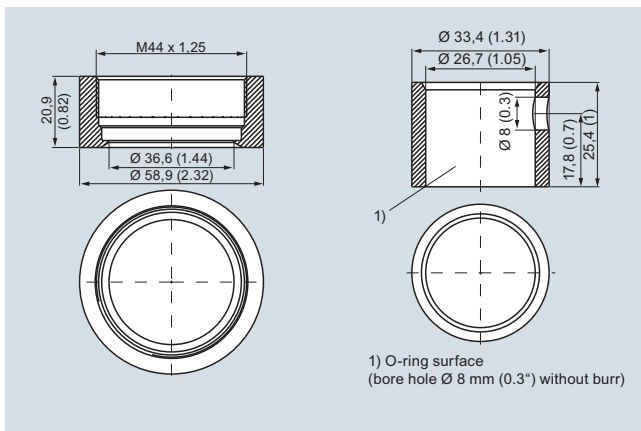
SITRANS P DS III pressure transmitters for gauge pressure, with PMC connection, dimensions in mm (inch)

The diagram shows a SITRANS P DS III with an example of a flange. In this drawing the height is subdivided into H_1 and H_2 .

H_1 = Height of the SITRANS P DS III up to a defined cross-section

H_2 = Height of the flange up to this defined cross-section

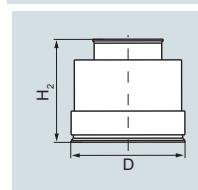
Only the height H_2 is indicated in the dimensions of the flanges.



PMC Style Standard (left) and PMC Style Minibolt (right) weldable sockets, dimensions in mm (inch)

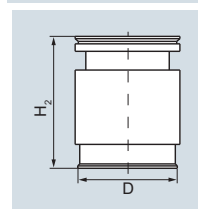
Material: Stainless steel, Mat. No. 1.4404/316L

PMC Style standard



DN	PN	ØD	H ₂
		40.9 mm (1.6")	approx. 36.8 mm (1.4")

PMC Style minibolt



DN	PN	ØD	H ₂
		26.3 mm (1.0")	approx. 33.1 mm (1.3")

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P300 with PMC connection

Technical specifications

SITRANS P300 for gauge pressure with PMC connection for the paper industry

	HART	PROFIBUS PA and FOUNDATION Fieldbus
Input	Gauge pressure (front-flush)	
Measured variable	Gauge pressure (front-flush)	
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Nominal measuring range
	Max. perm. test pressure	Max. perm. test pressure
	0.01 ... 1 bar (0.15 ... 14.5 psi)	1 bar (14.5 psi)
	0.04 ... 4 bar (0.58 ... 58 psi)	4 bar (58 psi)
	0.16 ... 16 bar (2.3 ... 232 psi)	16 bar (232 psi)
	6 bar (87 psi)	6 bar (87 psi)
	10 bar (145 psi)	10 bar (145 psi)
	32 bar (464 psi)	32 bar (464 psi)
	Depending on the process connection, the span may differ from these values	Depending on the process connection, the nominal measuring range may differ from these values
Lower measuring limit	100 mbar a (1.45 psia)	
• Measuring cell with silicone oil		
Upper measuring limit		
• Measuring cell with silicone oil	100 % of max. span	100 % of the max. nominal measuring range
Output		
Output signal	4 ... 20 mA	Digital PROFIBUS PA signal
Physical bus	-	IEC 61158-2
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.	
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)	
Measuring accuracy	Acc. to IEC 60770-1	
Reference conditions (All error data always refer to the set span)	Rlncreasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, measuring cell with silicone oil, room temperature 25 °C (77 °F)	
	Span ratio $r = \text{max. span}/\text{set span}$	Nominal measuring range ratio $r = \text{nominal measuring range}/\text{set measuring range}$
Error in measurement at limit setting incl. hysteresis and reproducibility		
Linear characteristic		
• $r + 10$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq (0.0029 \cdot r + 0.071) \%$
• $10 < r \leq 30$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq (0.0045 \cdot r + 0.071) \%$
• $30 < r \leq 100$	$\leq (0.005 \cdot r + 0.05) \%$	$\leq (0.005 \cdot r + 0.05) \%$
Step response time T_{63}	approx. 2 s	
Long-term stability at ± 30 °C (± 54 °F)	$\leq (0.25 \cdot r) \%/5$ years	$\leq (0.25 \cdot r) \%/5$ years
Influence of ambient temperature		
• at -10 ... +60 °C (14 ... 140 °F)	$\leq (0.1 \cdot r + 0.2) \%^{1)}$	$\leq (0.1 \cdot r + 0.2) \%^{1)}$
• at -40 ... -10 °C and 60 ... 85 °C (-40 ... 14 °F and 140 ... 185 °F)	$\leq (0.1 \cdot r + 0.15) \%/10$ K	$\leq (0.1 \cdot r + 0.15) \%/10$ K
Influence of the medium temperature (only with front-flush diaphragm)		
• Temperature difference between medium temperature and ambient temperature	3 mbar/10 K (1.2 inH ₂ O/10 K)	
Rated conditions		
<u>Installation conditions</u>		
Ambient temperature	Observe the temperature class in areas subject to explosion hazard.	
• Measuring cell with silicone oil	-40 ... +85 °C (-40 ... +185 °F)	
• Display readable	-30 ... +85 °C (-22 ... +185 °F)	
• Storage temperature	-50 ... +85 °C (-58 ... +185 °F)	
Climatic class		
Condensation	Relative humidity 0 ... 100 %. Condensation permissible, suitable for use in the tropics	
Degree of protection acc. to EN 60529	IP65, IP68, NEMA 4X, enclosure cleaning, resistant to lyes, steam to 150 °C (302 °F)	
Electromagnetic Compatibility		
• Emitted interference and interference immunity	Acc. to IEC 61326 and NAMUR NE 21	

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P300 with PMC connection

1

SITRANS P300 for gauge pressure with PMC connection for the paper industry		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
<u>Medium conditions</u>		
Temperature of medium		
• Measuring cell with silicone oil		-40 ... +100 °C (-40 ... +212 °F)
Design		
Weight (without options)		Approx. 1 kg (2.2 lb)
Enclosure material		Stainless steel, mat. no. 1.4301/304
Material of parts in contact with the medium		
• Seal diaphragm		Hastelloy C276, mat. no. 2.4819
• Measuring cell filling		Silicone oil
Surface quality touched-by-media		Ra-values ≤ 0.8 μm (32 μ inch)/welds Ra ≤ 1.6 μm (64 μ inch)
Power supply U_H		
Terminal voltage on transmitter	10.5 ... 42 V DC for intrinsically safe operation: 10.5 ... 30 V DC	Supplied through bus
Separate power supply	-	Not necessary
Bus voltage		
• Without Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Max. basic current	-	12.5 mA
• Start-up current ≤ basic current	-	Yes
• Max. fault current in the event of a fault	-	15.5 mA
Fault disconnection electronics (FDE)	-	Available
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of Article 3, paragraph 3 (sound engineering practice)	
Explosion protection		
Intrinsic safety "i"	PTB 05 ATEX 2048	
Marking	Ex II 1/2 G Ex ia/ib IIB/IIC T4, T5, T6	
Permissible ambient temperature		
• Temperature class T4	-40 ... +85 °C (-40 ... +185 °F)	
• Temperature class T5	-40 ... +70 °C (-40 ... +158 °F)	
• Temperature class T6	-40 ... +60 °C (-40 ... +140 °F)	
Connection	To certified intrinsically-safe circuits with peak values: U _i = 30 V, I _i = 100 mA, P _i = 750 mW, R _i = 300 Ω	To certified intrinsically-safe circuits with peak values: FISCO supply unit: U _i = 17.5 V, I _i = 380 mA, P _i = 5.32 W Linear barrier: U _i = 24 V, I _i = 250 mA, P _i = 1.2 W
Effective inner capacitance:	C _i = 6 nF	C _i = 1.1 nF
Effective internal inductance:	L _i = 0.4 mH	L _i ≤ 7 μH
Explosion protection to FM for USA <u>and</u> Canada (cFM _{US})		
• Identification (DIP) or (IS); (NI)	Certificate of Compliance 3025099 CL I, DIV 1, GP ABCD T4 ... T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4 ... T6; CL I, DIV 2, GP ABCD T4 ... T6; CL II, DIV 2, GP FG; CL III	
• Identification (DIP) or (IS)	Certificate of Compliance 3025099C CL I, DIV 1, GP ABCD T4 ... T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC 4 ... T6; CL I, DIV 2, GP ABCD T4 ... T6; CL II, DIV 2, GP FG; CL III	

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.08 · r + 0.16) % / 28 °C (50 °F).

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P300 with PMC connection

HART communication		FOUNDATION Fieldbus communication	
HART	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool Local operation (standard setting Address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	One measured value: 5 bytes Two measured values: 10 bytes	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	Register operating mode: 1 bytes Reset function due to metering. 1 bytes	• PID	1 resource block
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Function blocks	2	Transducer blocks	
• Analog input		• Pressure transducer block	
- Adaptation to customer-specific process variables	Linearly rising or falling characteristic	- Can be calibrated by applying two pressures	Yes
- Electrical damping	0 ... 100 s adjustable	- Monitoring of sensor limits	Yes
- Simulation function	Input /Output	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset and preset Optional direction of counting Simulation function of the register output		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 31 nodes		
- Characteristic curve	Linear		
- Simulation function	Available		
• Transducer block "Electronic temperature"			
Simulation function	Available		

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P300 with PMC connection

1

Selection and Ordering data		Article No.	Selection and Ordering data		Article No.
SITRANS P300 pressure transmitters with PMC connection , single-chamber measuring housing, rating plate inscription in English			SITRANS P300 pressure transmitters with PMC connection , single-chamber measuring housing, rating plate inscription in English		
with 4 ... 20 mA / HART		7 MF 8 1 2 3 -	with 4 ... 20 mA / HART		7 MF 8 1 2 3 -
with PROFIBUS PA		7 MF 8 1 2 4 -	with PROFIBUS PA		7 MF 8 1 2 4 -
with FOUNDATION Fieldbus (FF)		7 MF 8 1 2 5 -	with FOUNDATION Fieldbus (FF)		7 MF 8 1 2 5 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Display		
Measuring cell filling	Measuring cell cleaning		<ul style="list-style-type: none"> Without display, with keys, closed lid With display and keys, closed lid⁶⁾ 		1 2
Silicone oil	normal	1	<ul style="list-style-type: none"> With display and keys, lid with Makrolon pane (setting on HART devices: mA, with PROFIBUS PA and FOUNDATION Fieldbus equipment: pressure units)⁶⁾ 		4
Inert liquid	Cleanliness level 2 to DIN 25410	3	<ul style="list-style-type: none"> With display and keys (setting acc. to specifications, Order code "Y21" or "Y22" required), lid with Makrolon pane⁶⁾ 		5
Measuring span			<ul style="list-style-type: none"> With display and keys, lid with glass pane (setting on HART devices: mA, with PROFIBUS PA and FOUNDATION Fieldbus equipment: pressure unit)⁶⁾ 		6
1 bar ¹⁾	(14.5 psi)	B	<ul style="list-style-type: none"> With display (setting acc. to specifications, Order code "Y21" or "Y22" required), lid with glass pane⁶⁾ 		7
4 bar	(58 psi)	C			
16 bar	(232 psi)	D			
Wetted parts materials			Power supply units see Chap. 7 "Supplementary Components".		
Seal diaphragm	Measuring cell		Included in delivery of the device:		
Hastelloy	Stainless steel	B	<ul style="list-style-type: none"> Brief instructions (Leporello) CD-ROM with detailed documentation sealing ring 		
Process connection			<ul style="list-style-type: none"> 1) Only with "Standard" process connection 2) Not in conjunction with electrical connection option A. 3) Only available together with electrical connection options B, C or G. 4) Only together with HART electronics. 5) Without cable gland. 6) Display cannot be turned. 		
<ul style="list-style-type: none"> PMC Style Standard: Thread 1½" PMC Style Minibolt: front-flush 1" (minimum span: 500 mbar (7.25 psi), not available with 1-bar-measuring cell (Option B)) 		2 3			
Non-wetted parts materials					
<ul style="list-style-type: none"> Stainless steel, deep-drawn and electrolytically polished 		4			
Version					
<ul style="list-style-type: none"> Standard versions 		1			
Explosion protection					
<ul style="list-style-type: none"> None With ATEX, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety (Ex ia)" Zone 20/21/22²⁾ Ex nA/nL (Zone 2)³⁾ With FM + CSA, Type of protection: <ul style="list-style-type: none"> "Intrinsic Safe (is)" (planned) 		A B C E M			
Electrical connection/cable entry					
<ul style="list-style-type: none"> Screwed gland M20 x .5 (polyamide)⁴⁾ Screwed gland M20 x 1.5 (metal) Screwed gland M20 x 1.5 (stainless steel) M12 connectors (without cable socket) M12 connectors (stainless steel), without cable socket ½-14 NPT metal thread⁵⁾ ½-14 NPT stainless steel thread⁵⁾ 		A B C F G H J			

Pressure Measurement

Transmitters for gauge pressure for the paper industry

SITRANS P300 with PMC connection

1

Selection and Ordering data	Order code				Selection and Ordering data	Order code			
Further designs		HART	PA	FF	Additional data		HART	PA	FF
Add "-Z" to Article No. and specify Order code.					Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Cable socket for M12 plug					Measuring range to be set	Y01	✓	✓	✓ ¹⁾
• Stainless steel	A51		✓	✓	Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi				
Rating plate inscription (instead of English)					Stainless steel tag plate and entry in device variable (measuring point description)	Y15	✓	✓	✓
• German	B10	✓	✓	✓	Max. 16 characters, specify in plain text: Y15:				
• French	B12	✓	✓	✓	Measuring point text (entry in device variable)	Y16	✓	✓	✓
• Spanish	B13	✓	✓	✓	Max. 27 char., specify in plain text: Y16:				
• Italian	B14	✓	✓	✓	Entry of HART address (TAG)	Y17	✓		
English rating plate	B21	✓	✓	✓	Max. 8 char., specify in plain text: Y17:				
Pressure units in inH ₂ O and/or psi					Setting of pressure indication in pressure units	Y21	✓	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	✓	✓	✓	Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ...				
Inspection certificate	C12	✓	✓	✓	Note: The following pressure units can be selected:				
Acc. to EN 10204-3.1					bar, mbar, mm H ₂ O ¹⁾ , inH ₂ O ¹⁾ , ftH ₂ O ¹⁾ , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or %				
Factory certificate	C14	✓	✓	✓	*) ref. temperature 20 °C				
Acc. to EN 10204-2.2					Setting of pressure indication in non-pressure units²⁾	Y22 + Y01	✓		
Set output signal to upper limit of 22.0mA	D05	✓	✓	✓	Specify in plain text: Y22: up to l, m ³ , m, USg, ...				
Degree of protection IP65/IP68 (only for M20x1.5 and ½-14 NPT)	D12	✓	✓	✓	(specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)				
Mounting					Preset bus address	Y25		✓	✓
• Weldable sockets for standard 1½" threaded connection	P01	✓	✓	✓	possible between 1 and 126				
• Weldable socket for minibolt connection 1" (incl. screw 5/16-18 UNC-2B and washer)	P02	✓	✓	✓	Specify in plain text: Y25:				

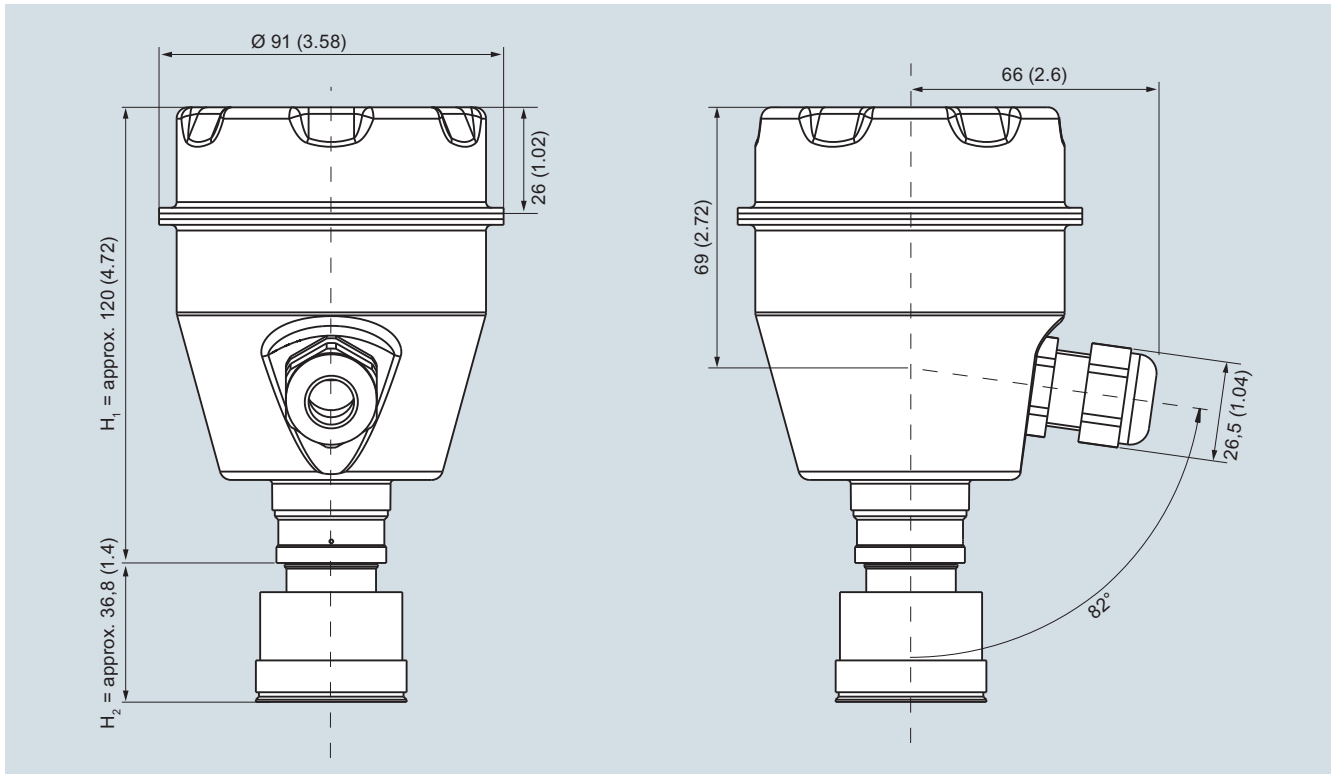
Only "Y01" and "Y21" can be factory preset

✓ = available

¹⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

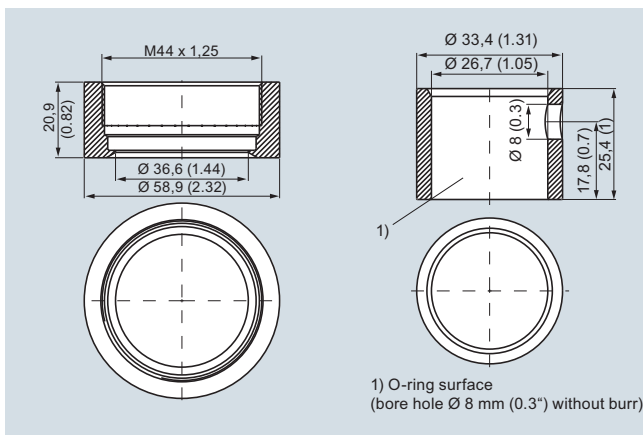
²⁾ Preset values can only be changed over SIMATIC PDM.

Dimensional drawings



SITRANS P300 pressure transmitters for gauge pressure, with PMC connection, dimensions in mm (inch)

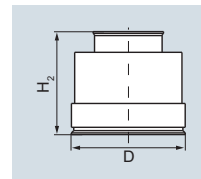
The diagram shows a SITRANS P300 with an example of a flange. In this drawing the height is subdivided into H_1 and H_2 .
 H_1 = Height of the SITRANS P300 up to a defined cross-section
 H_2 = Height of the flange up to this defined cross-section
 Only the height H_2 is indicated in the dimensions of the flanges.



PMC Style Standard (left) and PMC Style Minibolt (right) weldable sockets, dimensions in mm (inch)

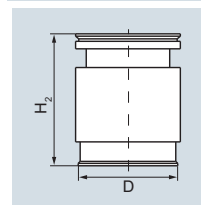
Material: Stainless steel, mat. No. 1.4404 / 316L

PMC Style Standard



DN	PN	ØD	H ₂
		40.4 mm (1.6")	Approx. 36.8 mm (1.4")

PMC Style Mini bolt



DN	PN	ØD	H ₂
		26.3 mm (1.0")	Approx. 33.1 mm (1.3")

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III - Technical description

1

Overview



SITRANS P DS III pressure transmitters are digital pressure transmitters featuring extensive user-friendliness and high accuracy. The parameterization is performed using control keys or via HART, PROFIBUS-PA or FOUNDATION Fieldbus interface.

Extensive functionality enables the pressure transmitter to be precisely adapted to the plant's requirements. Operation is very simple in spite of the numerous setting options.

Transmitters with type of protection "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The transmitters are provided with an EC type examination certificate and comply with the corresponding harmonized European standards (ATEX).

The transmitters can be equipped with various designs of remote seals for special applications such as the measurement of highly viscous substances.

Various versions of the DS III pressure transmitters are available for measuring:

- Gauge pressure
- Absolute pressure
- Differential pressure
- Level
- Volume level
- Mass level
- Volume flow
- Mass flow

Benefits

- High quality and service life
- High reliability even under extreme chemical and mechanical loads
- For aggressive and non-aggressive gases, vapors and liquids
- Extensive diagnosis and simulation functions
- Separate replacement of measuring cell and electronics without recalibration
- Minimum conformity error
- Good long-term stability
- Wetted parts made of high-grade materials (e.g. stainless steel, Hastelloy, gold, Monel, tantalum)

- Infinitely adjustable span from 0.01 bar to 700 bar (0.15 psi to 10153 psi) for DS III with HART interface
- Nominal measuring range from 1 bar to 700 bar (14.5 psi to 10153 psi) for DS III with PROFIBUS PA and FOUNDATION Fieldbus interface
- High measuring accuracy
- Parameterization over control keys and HART or PROFIBUS PA, or FOUNDATION Fieldbus interface.

Application

The pressure transmitters of the DS III series, can be used in industrial areas with extreme chemical and mechanical loads. Electromagnetic compatibility in the range 10 kHz to 1 GHz makes the DS III pressure transmitters suitable for locations with high electromagnetic emissions.

Pressure transmitters with type of protection "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The pressure transmitters are provided with an EC type examination certificate and comply with the corresponding harmonized European standards (ATEX).

Pressure transmitters with the type of protection "Intrinsic safety" for use in zone 0 may be operated with power supply units of category "ia" and "ib".

The transmitters can be equipped with various designs of remote seals for special applications such as the measurement of highly viscous substances.

The pressure transmitter can be programmed locally using the 3 control buttons or externally via HART or PROFIBUS PA or FOUNDATION Fieldbus interface.

Pressure transmitter for gauge pressure

Measured variable: Gauge pressure of aggressive and non-aggressive gases, vapors and liquids.

Span (infinitely adjustable)

for DS III with HART: 0.01 bar to 700 bar (0.15 psi to 10153 psi)

Nominal measuring range

for DS III with PROFIBUS PA and FOUNDATION Fieldbus:
1 bar to 700 bar (14.5 psi to 10153 psi)

Pressure transmitters for absolute pressure

Measured variable: Absolute pressure of aggressive and non-aggressive gases, vapors and liquids.

Span (infinitely adjustable)

for DS III with HART: 8.3 mbar a ... 100 bar a (0.12 ... 1450 psia)

Nominal measuring range

for DS III with PROFIBUS PA and FOUNDATION Fieldbus:
250 mbar a ... 100 bar a (3.6 ... 1450 psia)

There are two series:

- Gauge pressure series
- Differential pressure series

Pressure transmitters for differential pressure and flow

Measured variables:

- Differential pressure
- Small positive or negative pressure
- Flow $q \sim \sqrt{\Delta p}$ (together with a primary differential pressure device (see Chapter "Flow Meters"))

Span (infinitely adjustable)

for DS III with HART: 1 mbar ... 30 bar (0.0145 ... 435 psi)

Nominal measuring range

for DS III with PROFIBUS PA and FOUNDATION Fieldbus:
20 mbar ... 30 bar (0.29 ... 435 psi)

Pressure transmitters for level

Measured variable: Level of aggressive and non-aggressive liquids in open and closed vessels.

Span (infinitely adjustable)

for DS III with HART: 25 mbar ... 5 bar (0.363 ... 72.5 psi)

Nominal measuring range

for DS III with PROFIBUS PA and FOUNDATION Fieldbus:
250 mbar ... 5 bar (3.63 ... 72.5 psi)

Nominal diameter of the mounting flange

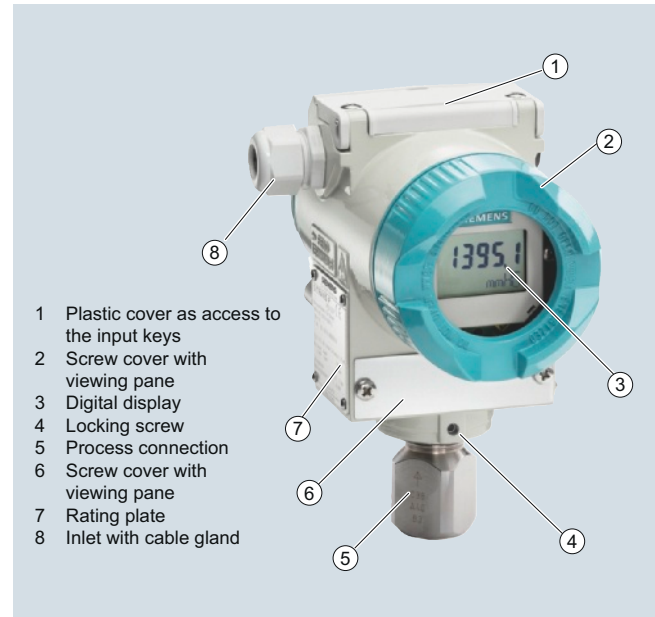
- DN 80 or DN 100
- 3 inch or 4 inch

In the case of level measurements in open containers, the low-pressure connection of the measuring cell remains open (measurement "compared to atmospheric").

In the case of measurements in closed containers, the lower-pressure connection has to be connected to the container in order to compensate the static pressure.

The wetted parts are made from a variety of materials, depending on the degree of corrosion resistance required.

Design



Front view

The transmitter consists of various components depending on the order. The possible versions are listed in the ordering information. The components described below are the same for all transmitters.

The rating plate (7, Figure "Front view") with the Article No. is located on the side of the housing. The specified number together with the ordering information provide details on the optional design details and on the possible measuring range (physical properties of built-in sensor element).

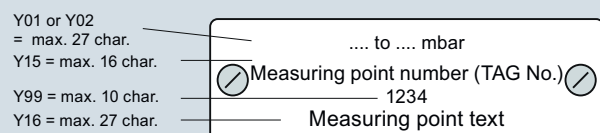
The approval label is located on the opposite side.

The housing is made of die-cast aluminium or stainless steel precision casting. A round cover (6) is screwed on at the front and rear of the housing. The front cover can be fitted with a viewing pane so that the measured values can be read directly on the display. The inlet (8) for the electrical connection is located either on the left or right side. The unused opening on the opposite side is sealed by a blanking plug. The protective earth connection is located on the rear of the housing.

The electrical connections for the power supply and screen are accessible by unscrewing the rear cover. The bottom part of the housing contains the measuring cell with process connection (5). The measuring cell is prevented from rotating by a locking screw (4). As the result of this modular design, the measuring cell and the electronics can be replaced separately from each other. The set parameter data are retained.

At the top of the housing is a plastic cover (1), which hides the input keys.

Example for an attached measuring point label



Pressure Measurement

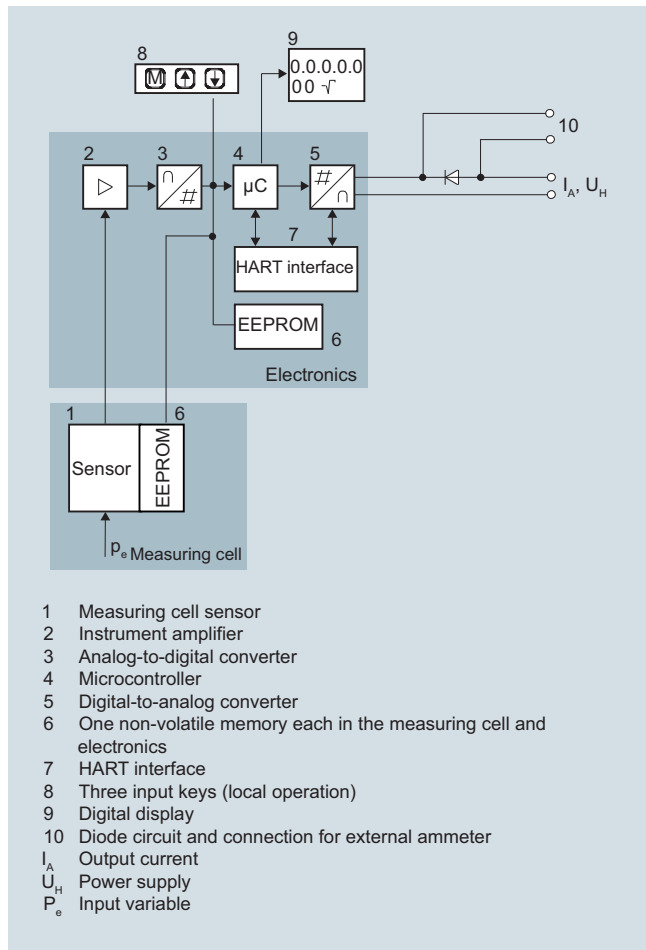
Transmitters for general requirements

SITRANS P DS III - Technical description

1

Function

Operation of electronics with HART communication



- | | |
|-------|--|
| 1 | Measuring cell sensor |
| 2 | Instrument amplifier |
| 3 | Analog-to-digital converter |
| 4 | Microcontroller |
| 5 | Digital-to-analog converter |
| 6 | One non-volatile memory each in the measuring cell and electronics |
| 7 | HART interface |
| 8 | Three input keys (local operation) |
| 9 | Digital display |
| 10 | Diode circuit and connection for external ammeter |
| I_A | Output current |
| U_H | Power supply |
| p_e | Input variable |

Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of the electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in a microcontroller, its linearity and temperature response corrected, and converted in a digital-to-analog converter (5) into an output current of 4 to 20 mA.

The diode circuit (10) protects against incorrect polarity.

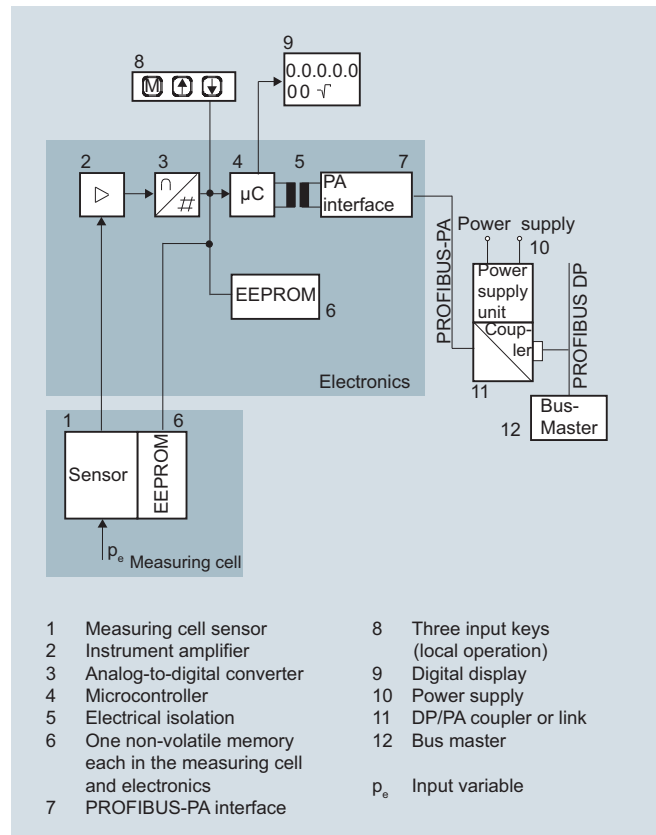
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the 3 input keys (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The HART modem (7) permits parameterization using a protocol according to the HART specification.

The pressure transmitters with spans ≤ 63 bar measure the input pressure compared to atmosphere, transmitters with spans ≥ 160 bar compared to vacuum.

Operation of electronics with PROFIBUS PA communication



- | | | | |
|---|--|-------|------------------------------------|
| 1 | Measuring cell sensor | 8 | Three input keys (local operation) |
| 2 | Instrument amplifier | 9 | Digital display |
| 3 | Analog-to-digital converter | 10 | Power supply |
| 4 | Microcontroller | 11 | DP/PA coupler or link |
| 5 | Electrical isolation | 12 | Bus master |
| 6 | One non-volatile memory each in the measuring cell and electronics | | |
| 7 | PROFIBUS-PA interface | p_e | Input variable |

Function diagram of electronics

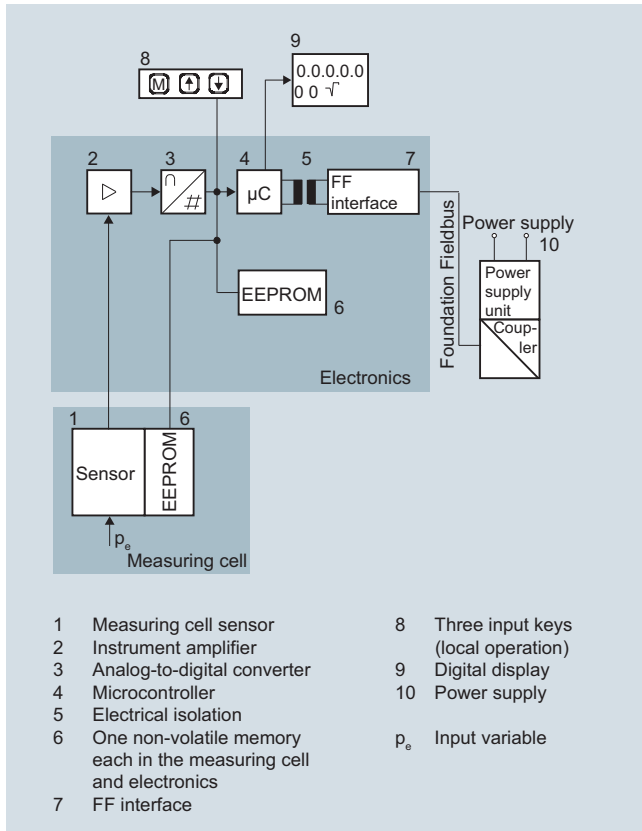
The bridge output voltage created by the sensor (1, Figure "Function diagram of the electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in the microcontroller, its linearity and temperature response corrected, and provided on the PROFIBUS PA through an electrically isolated PA interface (7).

The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The results with status values and diagnostic values are transferred by cyclic data transmission on the PROFIBUS PA. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as SIMATIC PDM is required for this.

Operation of electronics with FOUNDATION Fieldbus communication



Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in the microcontroller, its linearity and temperature response corrected, and provided on the FOUNDATION Fieldbus through an electrically isolated FOUNDATION Fieldbus interface (7).

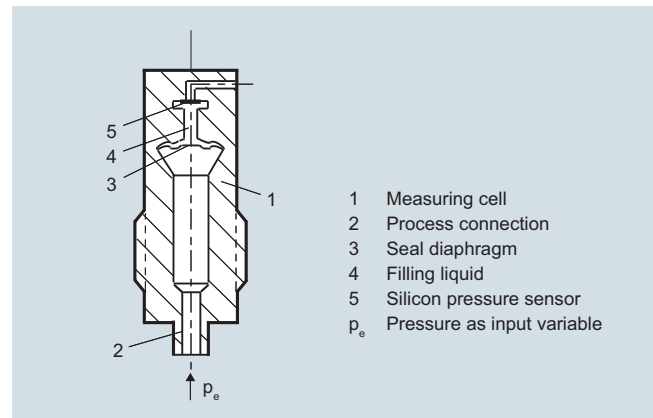
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The results with status values and diagnostic values are transferred by cyclic data transmission on the FOUNDATION Fieldbus. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as National Instruments Configurator is required for this.

Mode of operation of the measuring cells

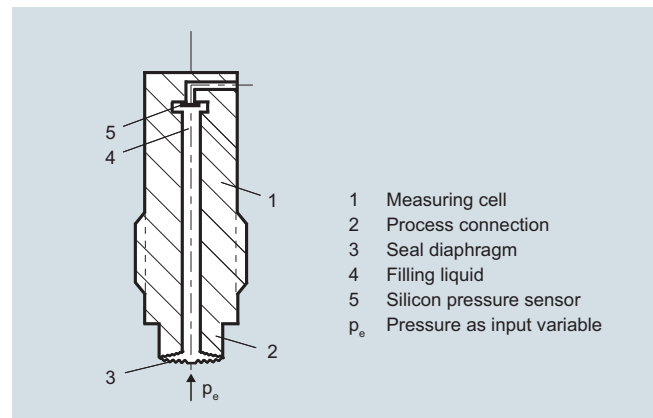
Measuring cell for gauge pressure



Measuring cell for gauge pressure, function diagram

The pressure p_e is applied through the process connection (2, Figure "Measuring cell for gauge pressure, function diagram") to the measuring cell (1). This pressure is subsequently transmitted further through the seal diaphragm (3) and the filling liquid (4) to the silicon pressure sensor (5) whose measuring diaphragm is then flexed. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the absolute pressure.

Measuring cell for gauge pressure with front-flush diaphragm



Measuring cell for gauge pressure, with front-flush diaphragm for paper industry, function diagram

The pressure p_e is applied through the process connection (2, Figure "Measuring cell for gauge pressure, with front-flush diaphragm for paper industry, function diagram") to the measuring cell (1). This pressure is subsequently transmitted further through the seal diaphragm (3) and the filling liquid (4) to the silicon pressure sensor (5) whose measuring diaphragm is then flexed. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the absolute pressure.

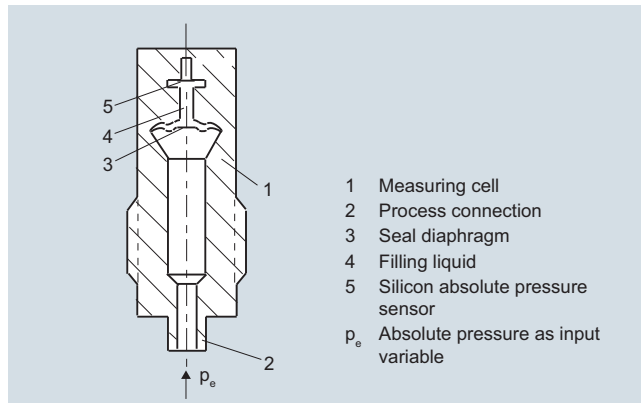
Pressure Measurement

Transmitters for general requirements

1

SITRANS P DS III - Technical description

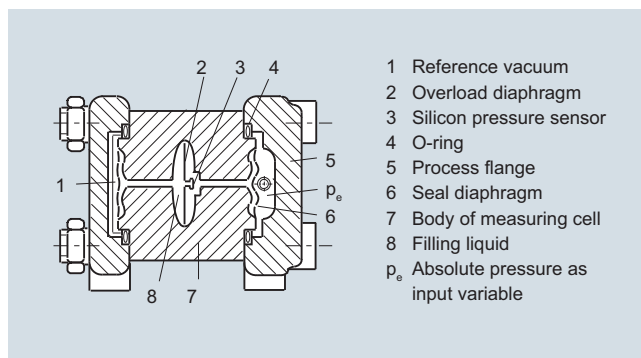
Measuring cell for absolute pressure from gauge pressure series



Measuring cell for absolute pressure from the pressure series, function diagram

The absolute pressure p_e is transmitted through the seal diaphragm (3, Figure "Measuring cell for absolute pressure from pressure series, gauge pressure, function diagram") and the filling liquid (4) to the silicon absolute pressure sensor (5) whose measuring diaphragm is then flexed. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the absolute pressure.

Measuring cell for absolute pressure from differential pressure series



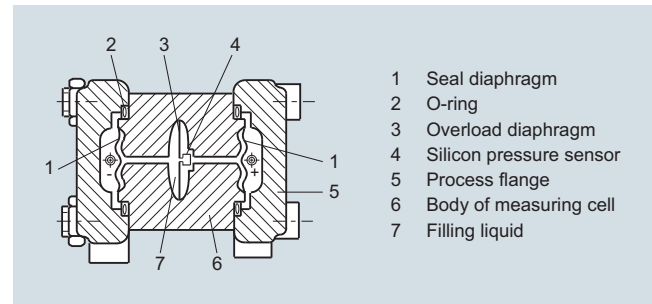
Measuring cell for absolute pressure from differential pressure series, function diagram

The input pressure p_e is transmitted through the seal diaphragm (6, Figure "Measuring cell for absolute pressure from differential pressure series, function diagram") and the filling liquid (8) to the silicon pressure sensor (3).

The difference in pressure between the input pressure p_e and the reference vacuum (1) on the low-pressure side of the measuring cell flexes the measuring diaphragm. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the absolute pressure.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (2) is flexed until the seal diaphragm rests on the body of the measuring cell (7), thus protecting the silicon pressure sensor from overloads.

Measuring cell for differential pressure and flow



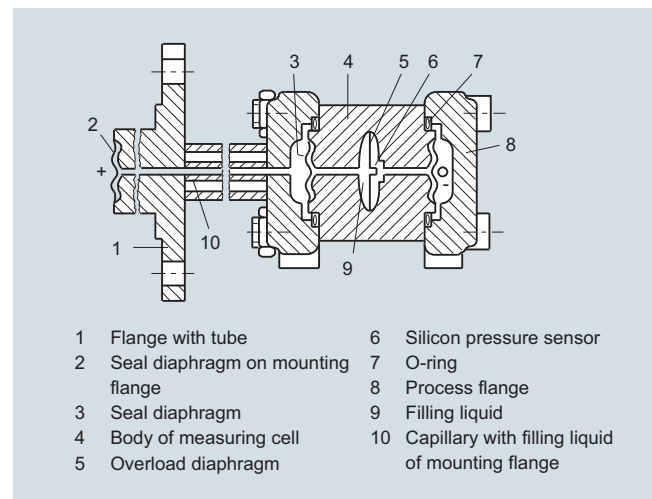
Measuring cell for differential pressure and flow, function diagram

The differential pressure is transmitted through the seal diaphragms (1, Figure "Measuring cell for differential pressure and flow, function diagram") and the filling liquid (7) to the silicon pressure sensor (4).

The measuring diaphragm is flexed by the applied differential pressure. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the absolute pressure.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (3) is flexed until the seal diaphragm rests on the body of the measuring cell (6), thus protecting the silicon pressure sensor from overloads.

Measuring cell for level



Measuring cell for level, function diagram

The input pressure (hydrostatic pressure) acts hydraulically on the measuring cell through the seal diaphragm on the mounting flange (2, Figure "Measuring cell for level, function diagram"). This differential pressure is subsequently transmitted further through the measuring cell (3) and the filling liquid (9) to the silicon pressure sensor (6) whose measuring diaphragm is then flexed.

This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit.

This change in resistance results in a bridge output voltage proportional to the differential pressure.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (5) is flexed until the seal diaphragm rests on the body of the measuring cell (4), thus protecting the silicon pressure sensor from overloads.

Parameterization DS III

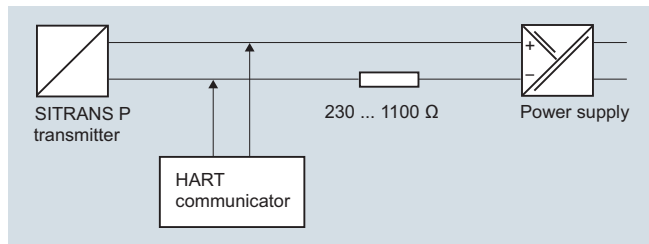
Depending on the version, there are a range of options for parameterizing the pressure transmitter and for setting or scanning the parameters.

Parameterization using the input buttons (local operation)

With the input buttons you can easily set the most important parameters without any additional equipment.

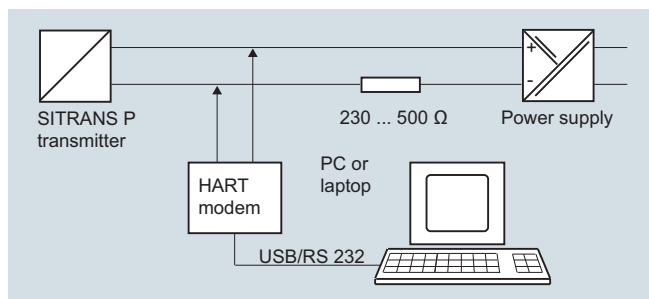
Parameterization using HART

Parameterization using HART is performed with a HART Communicator or a PC.



Communication between a HART Communicator and a pressure transmitter

When parameterizing with the HART Communicator, the connection is made directly to the 2-wire cable.



HART communication between a PC communicator and a pressure transmitter

When parameterizing with a PC, the connection is made through a HART modem.

The signals needed for communication in conformity with the HART 5.x or 6.x protocols are superimposed on the output current using the Frequency Shift Keying (FSK) method.

Adjustable parameters, DS III with HART

Parameters	Input keys (DS III HART)	HART communication
Start of scale	x	x
Full-scale value	x	x
Electrical damping	x	x
Start-of-scale value without application of a pressure ("Blind setting")	x	x
Full-scale value without application of a pressure ("Blind setting")	x	x
Zero adjustment current transmitter	x	x
Fault current	x	x
Disabling of buttons, write protection	x	x ¹⁾
Type of dimension and actual dimension	x	x
Characteristic (linear / square-rooted)	x ²⁾	x ²⁾
Input of characteristic		x
Freely-programmable LCD		x
Diagnostic functions		x

¹⁾ Cancel apart from write protection

²⁾ Only differential pressure

Diagnostic functions for DS III with HART

- Zero correction display
- Event counter
- Limit transmitter
- Saturation alarm
- Slave pointer
- Simulation functions
- Maintenance timer

Available physical units of display for DS III with HART

Table style: Technical specifications 2

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	Pa, MPa, kPa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , inH ₂ O, inH ₂ O (4 °C), mmH ₂ O, ftH ₂ O (20 °C), inHg, mmHg
Level (height data)	m, cm, mm, ft, in
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , US gallon, Imp. gallon, bushel, barrel, barrel liquid
Mass	g, kg, t, lb, Ston, Lton, oz
volume flow	m ³ /d, m ³ /h, m ³ /s, l/min, l/s, ft ³ /d, ft ³ /min, ft ³ /s, US gallon/min, US gallon/s
Mass flow	t/d, t/h, t/min, kg/d, kg/h, kg/min, kg/s, g/d, g/h, g/min, g/s, lb/d, lb/h, lb/min, lb/s, LTon/d, LTon/h, STon/d, STon/h, STon/min
Temperature	K, °C, °F, °R
Miscellaneous	%, mA

Parameterization through PROFIBUS PA interface

Fully digital communication through PROFIBUS PA, profile 3.0, is particularly user-friendly. Through the PROFIBUS the DS III with PROFIBUS PA is connected to a process control system, e. g. SIMATIC PSC 7. Communication is possible even in a potentially explosive environment.

For parameterization through PROFIBUS you need suitable software, e.g. SIMATIC PDM (Process Device Manager).

Parameterization through FOUNDATION Fieldbus interface

Fully digital communication through FOUNDATION Fieldbus is particularly user-friendly. Through the FOUNDATION Fieldbus the DS III with FOUNDATION Fieldbus is connected to a process control system. Communication is possible even in a potentially explosive environment.

For parameterization through the FOUNDATION Fieldbus you need suitable software, e.g. National Instruments Configurator.

Adjustable parameters for DS III with PROFIBUS PA and FOUNDATION Fieldbus

Parameters	Input keys	PROFIBUS PA and FOUNDATION Fieldbus interface
Electrical damping	x	x
Zero adjustment (correction of position)	x	x
Buttons and/or function disabling	x	x
Source of measured-value display	x	x
Physical dimension of display	x	x
Position of decimal point	x	x
Bus address	x	x
Adjustment of characteristic	x	x
Input of characteristic		x
Freely-programmable LCD		x
Diagnostics functions		x

Pressure Measurement

Transmitters for general requirements

1

SITRANS P DS III - Technical description

Diagnostic functions for DS III with PROFIBUS PA and FOUNDATION Fieldbus

- Event counter
- Slave pointer
- Maintenance timer
- Simulation functions
- Display of zero correction
- Limit transmitter
- Saturation alarm

Physical dimensions available for the display

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	MPa, kPa, Pa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , mmH ₂ O, mmH ₂ O (4 °C), inH ₂ O, inH ₂ O (4 °C), ftH ₂ O (20 °C), mmHg, inHg
Level (height data)	m, cm, mm, ft, in, yd
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , US gallon, Imp. gallon, bushel, barrel, barrel liquid
volume flow	m ³ /s, m ³ /min, m ³ /h, m ³ /d, l/s, l/min, l/h, l/d, Ml/d, ft ³ /s, ft ³ /min, ft ³ /h, ft ³ /d, US gallon/s, US gallon/min, US gallon/h, US gallon/d, bbl/s, bbl/min, bbl/h, bbl/d
Mass flow	g/s, g/min, g/h, g/d, kg/s, kg/min, kg/h, kg/d, t/s, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/s, STon/min, STon/h, STon/d, LTon/s, LTon/min, LTon/h, LTon/d
Total mass flow	t, kg, g, lb, oz, LTon, STon
Temperature	K, °C, °F, °R
Miscellaneous	%

Technical specifications

SITRANS P, DS III series for gauge pressure				
	HART		PROFIBUS PA and FOUNDATION Fieldbus	
Input				
Measured variable	Gauge pressure			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	0.01 ... 1 bar (0.15 ... 14.5 psi)	6 bar (87 psi)	1 bar (14.5 psi)	6 bar (87 psi)
	0.04 ... 4 bar (0.58 ... 58 psi)	10 bar (145 psi)	4 bar (58 psi)	10 bar (145 psi)
	0.16 ... 16 bar (2.32 ... 232 psi)	32 bar (464 psi)	16 bar (232 psi)	32 bar (464 psi)
	0.6 ... 63 bar (9.14 ... 914 psi)	100 bar (1450 psi)	63 bar (914 psi)	100 bar (1450 psi)
	1.6 ... 160 bar (23.2 ... 2320 psi)	250 bar (3626 psi)	160 bar (2320 psi)	250 bar (3626 psi)
	4.0 ... 400 bar (58 ... 5802 psi)	600 bar (8700 psi)	400 bar (5802 psi)	600 bar (8700 psi)
	7.0 ... 700 bar (102 ... 10153 psi)	800 bar (11603 psi)	700 bar (10153 psi)	800 bar (11603 psi)
Lower measuring limit	30 mbar a (0.44 psia)			
• Measuring cell with silicone oil filling	30 mbar a (0.44 psia)			
• Measuring cell with inert filling liquid	30 mbar a (0.44 psia)			
Upper measuring limit	100 % of max. span (for oxygen version and inert filling liquid; max. 120 bar (1740 psi))			
Output				
Output signal	4 ... 20 mA		Digital PROFIBUS PA and FOUNDATION Fieldbus signal	
• Lower limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA		-	
• Upper limit (infinitely adjustable)	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA		-	
Load				
• Without HART	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A in } \Omega$ U_H : Power supply in V		-	
• With HART	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)		-	
Physical bus	-		IEC 61158-2	
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy Acc. to IEC 60770-1				
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)			
	Span ratio $r = \text{max. span/set span}$		Nominal measuring range ratio $r = \text{nominal measuring range/set measuring range}$	
Error in measurement at limit setting incl. hysteresis and reproducibility				
• Linear characteristic				
- $r \leq 10$	$\leq (0.0029 \cdot r + 0.071) \%$		$\leq (0.0029 \cdot r + 0.071) \%$	
- $10 < r \leq 30$	$\leq (0.0045 \cdot r + 0.071) \%$		$\leq (0.0045 \cdot r + 0.071) \%$	
- $30 < r \leq 100$	$\leq (0.005 \cdot r + 0.05) \%$		$\leq (0.005 \cdot r + 0.05) \%$	
Long-term stability (temp.erature change $\pm 30 \text{ }^\circ\text{C}$ ($\pm 54 \text{ }^\circ\text{F}$))				
• 1 ... 4-bar measuring cell	$\leq (0.25 \cdot r) \%$ per 5 years		$\leq (0.25 \cdot r) \%$ per 5 years	
• 16 ... 700-bar measuring cell	$\leq (0.125 \cdot r) \%$ per 5 years		$\leq (0.125 \cdot r) \%$ per 5 years	
Influence of ambient temperature				
• at -10 ... +60 °C (14 ... 140 °F)	$\leq (0.08 \cdot r + 0.1) \%^{1)}$ (at 700 bar: $\leq (0.1 \cdot r + 0.2) \%^{2)}$		$\leq (0.08 \cdot r + 0.1) \%^{1)}$ (at 700 bar: $\leq (0.1 \cdot r + 0.2) \%^{2)}$	
• at -40 ... -10 °C and +60 ... +85 °C (-40 ... +14 °F and 140 ... 185 °F)	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$		$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	
Measured Value Resolution	-		$3 \cdot 10^{-5}$ of nominal measuring range	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge pressure

1

SITRANS P, DS III series for gauge pressure		HART	PROFIBUS PA and FOUNDATION Fieldbus
Rated conditions			
Degree of protection (to EN 60529)		IP66 (optional IP66/IP68), NEMA 4X	
Temperature of medium			
• Measuring cell with silicone oil filling		-40 ... +100 °C (-40 ... +212 °F)	
• Measuring cell with inert filling liquid		-20 ... +100 °C (-4 ... +212 °F)	
• In conjunction with dust explosion protection		-20 ... +60 °C (-4 ... +140 °F)	
Ambient conditions			
• Ambient temperature			
- Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics)		-40 ... +85 °C (-40 ... +185 °F)	
- Display readable		-30 ... +85 °C (-22 ... +185 °F)	
• Storage temperature		-50 ... +85 °C (-58 ... +185 °F)	
• Climatic class			
- Condensation		Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics	
• Electromagnetic Compatibility			
- Emitted interference and interference immunity		Acc. to IEC 61326 and NAMUR NE 21	
Design			
Weight (without options)		Die-cast aluminum: ≈ 2.0 kg (≈ 4.4 lb) Stainless steel precision casting: ≈ 4.6 kg (≈ 10.1 lb)	
Enclosure material		Low-copper die-cast aluminum, GD-ALSi 12 or stainless steel precision casting, mat. no. 1.4408	
Wetted parts materials			
• Connection shank		Stainless steel, mat. no. 1.4404/316L or Hastelloy C4, mat. no. 2.4610	
• Oval flange		Stainless steel, mat. no. 1.4404/316L	
• Seal diaphragm		Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819	
Measuring cell filling		Silicone oil or inert filling liquid (maximum value with oxygen measurement pressure 100 bar (1450 psi) at 60 °C (140 °F))	
Process connection		Connection shank G½B to DIN EN 837-1, female thread ½ -14 NPT or oval flange (PN 160 (MAWP 2320 psi)) to DIN 19213 with mounting thread M10 or 7/16-20 UNF to EN 61518	
Material of mounting bracket			
Steel		Sheet-steel, Mat. No. 1.0330, chrome-plated	
Stainless steel		Sheet stainless steel, mat. no. 1.4301 (SS 304)	
Power supply U_H			Supplied through bus
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode		-
Separate 24 V power supply necessary	-		No
Bus voltage			
• Not Ex	-		9 ... 32 V
• With intrinsically-safe operation	-		9 ... 24 V
Current consumption			
• Basic current (max.)	-		12.5 mA
• Start-up current ≤ basic current	-		Yes
• Max. current in event of fault	-		15.5 mA
Fault disconnection electronics (FDE) available	-		Yes

SITRANS P, DS III series for gauge pressure	HART	PROFIBUS PA and FOUNDATION Fieldbus
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	
Explosion protection		
• Intrinsic safety "i"		PTB 13 ATEX 2007 X
- Marking		Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb
- Permissible ambient temperature		-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +70 °C (-40 ... +158 °F) temperature class T5; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$; $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 174 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion-proof "d"		PTB 99 ATEX 1160
- Marking		Ex II 1/2 G Ex d IIC T4/T6 Gb
- Permissible ambient temperature		-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$
• Dust explosion protection for zone 20		PTB 01 ATEX 2055
- Marking		Ex II 1 D IP65 T 120 °C Ex II 1/2 D IP65 T 120 °C
- Permissible ambient temperature		-40 ... +85 °C (-40 ... +185 °F)
- Max. surface temperature		120 °C (248 °F)
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Dust explosion protection for zone 21/22		PTB 01 ATEX 2055
- Marking		Ex II 2 D IP65 T 120 °C
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$; $P_{\max} = 1.2 \text{ W}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$; $P_{\max} = 1 \text{ W}$
• Type of protection "n" (zone 2)		PTB 13 ATEX 2007 X
- Marking		Ex II 2/3 G Ex nA II T4/T5/T6 Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc
- Connection (Ex nA)	$U_m = 45 \text{ V}$	$U_m = 32 \text{ V}$
- Connections (Ex ic)	To circuits with values: $U_i = 45 \text{ V}$	FISCO supply unit ic: $U_o = 17.5 \text{ V}$, $I_o = 570 \text{ mA}$ Linear barrier: $U_o = 32 \text{ V}$, $I_o = 132 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion protection acc. to FM		Certificate of Compliance 3008490
- Identification (XP/DIP) or (IS); (NI)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	
• Explosion protection to CSA		Certificate of Compliance 1153651
- Identification (XP/DIP) or (IS)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.064 · r + 0.08) % / 28 °C (50 °F).

²⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.08 · r + 0.16) % / 28 °C (50 °F).

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge pressure

1

HART communication		FOUNDATION Fieldbus communication	
HART	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0, 1, or 2 (register operating mode and reset function for metering)	• PID	1 resource block
Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping, adjustable	0 ... 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input /Output		
- Failure mode	parameterizable (last good value, substitute value, incorrect value)		
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output		
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Square-rooted characteristic for flow measurement	Yes		
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge pressure

1

Selection and Ordering data		Article No.
Pressure transmitter for gauge pressure, SITRANS P DS III with HART		7MF4033-
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	▶ ◆ 1
Inert liquid ¹⁾	grease-free to cleanliness level 2	▶ ◆ 3
Measuring span (min. ... max.)		
0.01 ... 1 bar	(0.15 ... 14.5 psi)	▶ ◆ B
0.04 ... 4 bar	(0.58 ... 58 psi)	▶ ◆ C
0.16 ... 16 bar	(2.32 ... 232 psi)	▶ ◆ D
0.63 ... 63 bar	(9.14 ... 914 psi)	▶ ◆ E
1.6 ... 160 bar	(23.2 ... 2320 psi)	▶ ◆ F
4.0 ... 400 bar	(58.0 ... 5802 psi)	▶ ◆ G
7.0 ... 700 bar	(102.0 ... 10153 psi)	▶ ◆ J
Wetted parts materials		
Seal diaphragm	Process connection	
Stainless steel	Stainless steel	▶ ◆ A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version as diaphragm seal ^{2) 3) 4) 5)}		Y
Process connection		
• Connection shank G ¹ / ₂ B to EN 837-1		▶ ◆ 0
• Female thread 1/2-14 NPT		◆ 1
• Stainless steel oval flange with process connection (Oval flange has no female thread)		
- Mounting thread 7/16-20 UNF to IEC 61518		2
- Mounting thread M10 to DIN 19213		3
- Mounting thread M12 to DIN 19213		4
• Male thread M20 x 1.5		5
• Male thread 1/2-14 NPT		6
Non-wetted parts materials		
• Housing made of die-cast aluminium		▶ ◆ 0
• Housing stainless steel precision casting ⁶⁾		3
Version		
• Standard versions		◆ 1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)		▶ ◆ 2
Explosion protection		
• None		◆ A
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"		◆ B
- "Explosion-proof (Ex d) ⁷⁾ "		◆ D
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) ⁸⁾		◆ P
- "Ex nA/ic (Zone 2) ⁹⁾ "		◆ E
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D) ⁸⁾¹⁰⁾ "		▶ ◆ R
• FM + CSA intrinsic safe (is)		F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ¹⁰⁾		S
• With FM + CSA, Type of protection:		
- "Intrinsic Safe und Explosion Proof (is + xp) ⁷⁾ "		◆ NC
Electrical connection / cable entry		
• Screwed gland Pg 13.5 (adapter) ¹¹⁾		A
• Screwed gland M20 x 1.5		▶ ◆ B
• Screwed gland 1/2-14 NPT		◆ C
• Han 7D plug (plastic housing) incl. mating connector ¹¹⁾		D
• M12 connectors (stainless steel) ¹¹⁾¹²⁾		F

Selection and Ordering data		Article No.
Pressure transmitter for gauge pressure, SITRANS P DS III with HART		7MF4033-
Display		
• Without display		◆ 0
• Without visible display (display concealed, setting: mA)		▶ ◆ 1
• With visible display (setting: mA)		◆ 6
• with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)		◆ 7
▶ Available ex stock		
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.		
Power supply units see Chap. 7 "Supplementary Components".		
Included in delivery of the device:		
• Brief instructions (Leporello)		
• CD-ROM with detailed documentation		
¹⁾ For oxygen application, add Order code E10. ²⁾ When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here. ³⁾ If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. ⁴⁾ The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF403-..Y.-.... and 7MF4900-1...-B ⁵⁾ The standard measuring cell filling of configurations with remote seals (Y) is silicone oil. ⁶⁾ Not in conjunction with Electrical connection "Screwed gland Pg 13.5" and "Han7D plug". ⁷⁾ Without cable gland, with blanking plug ⁸⁾ With enclosed cable gland Ex ia and blanking plug ⁹⁾ Configurations with HAN and M12 connectors are only available in Ex ic. ¹⁰⁾ Only in connection with IP65. ¹¹⁾ Only in connection with Ex approval A, B or E. ¹²⁾ M12 delivered without cable socket		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge pressure

1

Selection and Ordering data	Article No.
Pressure transmitter for gauge pressure	
SITRANS P DS III with PROFIBUS PA (PA)	7 MF 4 0 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 MF 4 0 3 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring cell filling	
Silicone oil	1
Inert liquid ¹⁾	3
Measuring cell cleaning	
normal	
grease-free to cleanliness level 2	
Nominal measuring range	
1 bar (14.5 psi)	B
4 bar (58 psi)	C
16 bar (232 psi)	D
63 bar (914 psi)	E
160 bar (2320 psi)	F
400 bar (5802 psi)	G
700 bar (10153 psi)	J
Wetted parts materials	
Seal diaphragm	
Process connection	
Stainless steel	A
Hastelloy	B
Hastelloy	C
Version as diaphragm seal ^{2) 3) 4) 5)}	Y
Process connection	
• Connection shank G½B to EN 837-1	0
• Female thread ½-14 NPT	1
• Stainless steel oval flange with process connection (Oval flange has no female thread) ⁶⁾	
- Mounting thread 7/16-20 UNF to IEC 61518	2
- Mounting thread M10 to DIN 19213	3
- Mounting thread M12 to DIN 19213	4
• Male thread M20 x 1.5	5
• Male thread ½-14 NPT	6
Non-wetted parts materials	
• Housing made of die-cast aluminium	0
• Housing stainless steel precision casting	3
Version	
• Standard versions	1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	2
Explosion protection	
• None	A
• With ATEX, Type of protection:	
- "Intrinsic safety (Ex ia)"	B
- "Explosion-proof (Ex d)" ⁷⁾	D
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) ⁸⁾	P
- "Ex nA/ic (Zone 2)" ⁹⁾	E
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" ^{8) 10)} (not for DS III FF)	R
• FM + CSA intrinsic safe (is)	F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ¹⁰⁾	S
• With FM + CSA, Type of protection:	
- "Intrinsic Safe und Explosion Proof (is + xp)" ⁷⁾	NC
Electrical connection/cable entry	
• Screwed gland M20 x 1.5	B
• Screwed gland ½-14 NPT	C
• M12 connectors (stainless steel) ^{11) 12)}	F

Selection and Ordering data	Article No.
Pressure transmitter for gauge pressure	
SITRANS P DS III with PROFIBUS PA (PA)	7 MF 4 0 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 MF 4 0 3 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Display	
• Without display	0
• Without visible display (display concealed, setting: bar)	1
• With visible display (setting: bar)	6
• with customer-specific display (setting as specified, Order code "Y21" required)	7
Included in delivery of the device:	
• Brief instructions (Leporello)	
• CD-ROM with detailed documentation	
1) For oxygen application, add Order code E10.	
2) When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here.	
3) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.	
4) The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF403-...Y...-... and 7MF4900-1...-B	
5) The standard measuring cell filling of configurations with remote seals (Y) is silicone oil.	
6) M10 fastening thread: Max. span 160 bar (2320 psi) 7/16-20 UNF and M12 fastening thread: Max. span 400 bar (5802 psi)	
7) Without cable gland, with blanking plug.	
8) With enclosed cable gland Ex ia and blanking plug.	
9) Configurations with HAN and M12 connectors are only available in Ex ic.	
10) Only in connection with IP65.	
11) M12 delivered without cable socket.	
12) Only in connection with Ex approval A, B, E or F.	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge pressure

1

Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:				
• Steel	◆ A01	✓	✓	✓
• Stainless steel	◆ A02	✓	✓	✓
Plug				
• Han 7D (metal)	A30	✓		
• Han 8D (instead of Han 7D)	A31	✓		
• Angled	A32	✓		
• Han 8D (metal)	A33	✓		
Cable sockets for M12 connectors (metal (CuZn))	A50	✓	✓	✓
Rating plate inscription (instead of German)				
• English	◆ B11	✓	✓	✓
• French	◆ B12	✓	✓	✓
• Spanish	◆ B13	✓	✓	✓
• Italian	◆ B14	✓	✓	✓
• Cyrillic (russian)	◆ B16	✓	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	◆ B21	✓	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2¹⁾	◆ C11	✓	✓	✓
Inspection certificate²⁾ Acc. to EN 10204-3.1	◆ C12	✓	✓	✓
Factory certificate Acc. to EN 10204-2.2	◆ C14	✓	✓	✓
Functional safety (SIL2) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	◆ C20	✓		
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	C21 ³⁾		✓	
Functional safety (SIL2/3) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	◆ C23	✓		
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request)	C99	✓	✓	✓
Setting of upper limit of output signal to 22.0 mA	D05	✓		
Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009)	D07	✓	✓	✓
Degree of protection IP66/IP68 (only for M20x1.5 and ½-14 NPT)	D12	✓	✓	✓
Supplied with oval flange (1 item), PTFE packing and screws in thread of oval flange	D37	✓	✓	✓
Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓	✓
Use in or on zone 1D/2D (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B.. Ex ia)" and IP65)	E01	✓	✓	✓
Oxygen application (In the case of oxygen measurement and inert liquid max. 100 bar (1450 psi) at 60°C (140 °F))	E10	✓	✓	✓
Export approval Korea	E11	✓	✓	✓
CRN approval Canada (Canadian Registration Number)	E22	✓	✓	✓

Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Dual seal	E24	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25 ⁴⁾	✓	✓	✓
"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26 ⁴⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28 ⁴⁾	✓	✓	
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45 ⁴⁾	✓	✓	✓
Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46 ⁴⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55 ⁴⁾	✓	✓	✓
Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56 ⁴⁾	✓	✓	✓
Ex protection "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57 ⁴⁾	✓	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58 ⁴⁾	✓	✓	✓
"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]..-Z + E11)	E70 ⁴⁾	✓	✓	✓
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓	✓
Oval flange NAM (ASTAVA)	J06	✓	✓	✓

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

¹⁾ When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.

²⁾ If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.

³⁾ Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H

⁴⁾ Option does not include ATEX approval, but instead includes only the country-specific approval.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge pressure

1

Selection and Ordering data	Order code			
		HART	PA	FF
Additional data				
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set	◆ Y01	✓	✓ ¹⁾	
Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi				
Stainless steel tag plate and entry in device variable (measuring point description)	◆ Y15	✓	✓	✓
Max. 16 characters, specify in plain text: Y15:				
Measuring point text (entry in device variable)	◆ Y16	✓	✓	✓
Max. 27 characters, specify in plain text: Y16:				
Entry of HART address (TAG)	◆ Y17	✓		
Max. 8 characters, specify in plain text: Y17:				
Setting of pressure indication in pressure units	◆ Y21	✓	✓	✓
Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O [*] , inH ₂ O [*] , ftH ₂ O [*] , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % *) ref. temperature 20 °C				
Setting of pressure indication in non-pressure units²⁾	◆ Y22 + Y01	✓		
Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)				
Preset bus address	Y25		✓	✓
possible between 1 and 126 Specify in plain text: Y25:				
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset

✓ = available

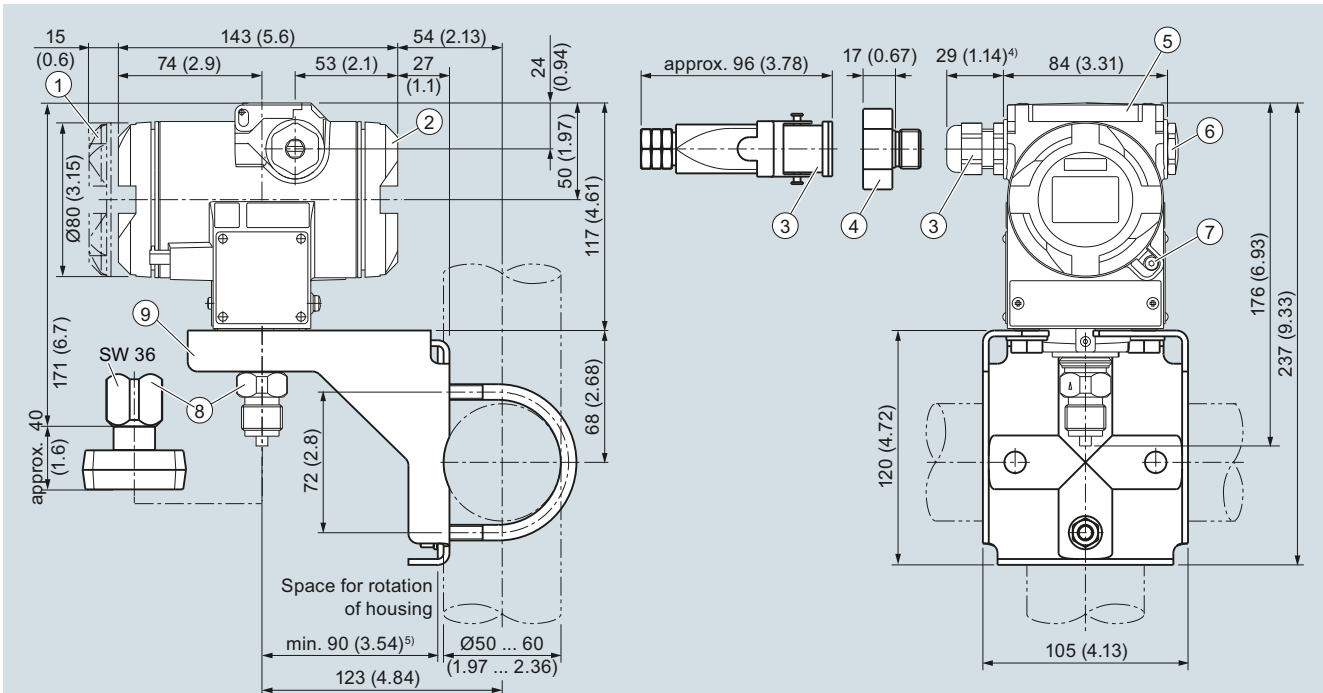
Ordering example

Item line: 7MF4033-1EA00-1AA7-Z
B line: A01 + Y01 + Y21
C line: Y01: 10 ... 20 bar (145 ... 290 psi)
C line: Y21: bar (psi)

¹⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

²⁾ Preset values can only be changed over SIMATIC PDM.

Dimensional drawings



① Electronic side, digital display
(longer overall length for cover with window)¹⁾

② Terminal side¹⁾

③ Electrical connection:
Screwed gland Pg 13,5 (adapter)(Adapter)²⁾³⁾,
Screwed gland M20 x 1,5 or Screwed gland ½-14 NPT or
Han 7D/Han 8D²⁾³⁾ plug

④ Harting adapter

⑤ Protective cover over keys

⑥ Blanking plug

⑦ Screw cover - safety bracket (only for type of protection
"Explosion-proof enclosure", not shown in the drawing)

⑧ Process connection: Connection shank G½B or Oval flange

⑨ Mounting bracket (option)

1) Allow approx. 20 mm (0.79 inch) thread length to permit unscrewing

2) Not with type of protection "Explosion-proof enclosure"

3) Not with type of protection "FM + CSA" [IS + XP]"

4) For Pg 13,5 with adapter approx. 45 mm (1.77 inch)

5) Minimum distance for rotating

SITRANS P DS III pressure transmitters for gauge pressure, dimensions in mm (inch)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

Technical specifications

SITRANS P DS III series for gauge and absolute pressure, with front-flush diaphragm				
	HART		PROFIBUS PA and FOUNDATION Fieldbus	
Input of gauge pressure, with front-flush diaphragm				
Measured variable	Gauge pressure, front-flush			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	0.01 ... 1 bar (0.15 ... 14.5 psi)	6 bar (87 psi)	1 bar (14.5 psi)	6 bar (87 psi)
	0.04 ... 4 bar (0.58 ... 58 psi)	10 bar (145 psi)	4 bar (58 psi)	10 bar (145 psi)
	0.16 ... 16 bar (2.32 ... 232 psi)	32 bar (464 psi)	16 bar (232 psi)	32 bar (464 psi)
	0.6 ... 63 bar (9.14 ... 914 psi)	100 bar (1450 psi)	63 bar (914 psi)	100 bar (1450 psi)
Lower measuring limit	100 mbar a (1.45 psia)			
Upper measuring limit	100 % of max. span		100 % of the max. nominal measuring range	
Input of absolute pressure, with front-flush diaphragm				
Measured variable	Absolute pressure, front-flush			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	43 ... 1300 mbar a (0.62 ... 18.85 psia)	10 bar a (145 psia)	1300 mbar a (18.85 psia)	10 bar a (145 psia)
	0.16 ... 5 bar a (2.32 ... 72.5 psia)	30 bar a (435 psia)	5 bar a (72.5 psia)	30 bar a (435 psia)
	1 ... 30 bar a (14.5 ... 435 psia)	100 bar a (1450 psia)	30 bar a (435 psia)	100 bar a (1450 psia)
Lower measuring limit	0 bar a (0 psia)			
Upper measuring limit	100 % of max. span		100 % of the max. nominal measuring range	
Output				
Output signal	4 ... 20 mA		Digital PROFIBUS PA and FOUNDATION Fieldbus signal	
• Lower limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA		-	
• Upper limit (infinitely adjustable)	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA		-	
Load				
• Without HART	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in Ω , U_H : Power supply in V		-	
• With HART	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)		-	
Physical bus	-		IEC 61158-2	
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy				
Acc. to IEC 60770-1				
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)			
	Span ratio $r = \text{max. span}/\text{set span}$		Nominal measuring range ratio $r = \text{nominal measuring range}/\text{set measuring range}$	
Error in measurement at limit setting incl. hysteresis and reproducibility	Gauge pressure, front-flush	Absolute pressure, front-flush	Gauge pressure, front-flush	Absolute pressure, front-flush
• Linear characteristic				
- $r \leq 10$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq 0.2 \%$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq 0.2 \%$
- $10 < r \leq 30$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq 0.4 \%$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq 0.4 \%$
- $30 < r \leq 100$	$\leq (0.005 \cdot r + 0.05) \%$	-	$\leq (0.005 \cdot r + 0.05) \%$	-
Long-term stability (temperature change $\pm 30 \text{ °C}$ ($\pm 54 \text{ °F}$))	$\leq (0.25 \cdot r) \%$ per 5 years		$\leq (0.25 \cdot r) \%$ per 5 years	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

1

SITRANS P DS III series for gauge and absolute pressure, with front-flush diaphragm	HART		PROFIBUS PA and FOUNDATION Fieldbus	
	Gauge pressure, front-flush	Absolute pressure, front-flush	Gauge pressure, front-flush	Absolute pressure, front-flush
Influence of ambient temperature				
• at -10 ... +60 °C (14 ... 140 °F)	$\leq (0.1 \cdot r + 0.2) \%^{1)}$	$\leq (0.2 \cdot r + 0.3) \%$	$\leq (0.1 \cdot r + 0.2) \%^{1)}$	$\leq (0.2 \cdot r + 0.3) \%$
• at -40 ... -10 °C and 60 ... 85 °C (-40 ... +14 °F and 140 ... 185 °F)	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.2 \cdot r + 0.3) \%/10 \text{ K}$	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.2 \cdot r + 0.3) \%/10 \text{ K}$
Influence of mounting position	0.1 mbar (0.04 inH ₂ O) per 10° inclination			
Measured Value Resolution	-		$3 \cdot 10^{-5}$ of nominal measuring range	
Influence of the medium temperature				
• Temperature difference between medium temperature and ambient temperature	3 mbar/10 K (0.04 psi/10 K)			
Rated conditions				
<u>Installation conditions</u>				
Ambient temperature	Observe the temperature class in areas subject to explosion hazard.			
• Measuring cell with silicone oil	-40 ... +85 °C (-40 ... +185 °F)			
• Measuring cell with Neobee oil (with front-flush diaphragm)	-10 ... +85 °C (14 ... +185 °F)			
• Measuring cell with inert liquid (not with front-flush diaphragm)	-20 ... +85 °C (-4 ... +185 °F)			
• Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics)	-40 ... +85 °C (-40 ... +185 °F)			
• Display readable	-30 ... +85 °C (-22 ... +185 °F)			
• Storage temperature	-50 ... +85 °C (-58 ... +185 °F) (in the case of Neobee: -20 ... +85 °C (-4 ... +185 °F)) (for high temperature oil: -10 ... +85 °C (14 ... 185 °F))			
• Climatic class	Relative humidity 0 ... 100 %			
- Condensation	Condensation permissible, suitable for use in the tropics			
Degree of protection (to IEC 60529)	IP66 (optional IP66/IP68), NEMA 4X			
• Electromagnetic Compatibility	Acc. to IEC 61326 and NAMUR NE 21			
- Emitted interference and interference immunity				
<u>Medium conditions</u>	The max. medium temperature of the front-flush process connections is to be taken into account in accordance with the relevant connection standards (e. g. DIN 32676, DIN 11851 etc.).			
Temperature of medium				
• Measuring cell with silicone oil	-40 ... +100 °C (-40 ... +212 °F)			
• Measuring cell with silicone oil (with front-flush diaphragm)	-40 ... +150 °C (-40 ... +302 °F)			
• Measuring cell with Neobee oil (with front-flush diaphragm)	-10 ... +150 °C (14 ... 302 °F)			
• Measuring cell with silicone oil, with temperature decoupler (only for gauge pressure version with front-flush diaphragm)	-40 ... +200 °C (-40 ... +392 °F)			
• Measuring cell with Neobee oil, with temperature decoupler (only for gauge pressure version with flush-mounted diaphragm)	-10 ... +200 °C (14 ... 392 °F)			
• Measuring cell with inert filling liquid	-20 ... +100 °C (-4 ... +212 °F)			
• Measuring cell with high-temperature oil (only for gauge pressure version with front-flush diaphragm)	-10 ... +250 °C (14 ... 482 °F)			
Design				
Weight (without options)	≈ 1.5 kg (≈ 3.3 lb)			
Enclosure material	Low-copper die-cast aluminum, GD-AlSi12 or stainless steel precision casting, mat. no. 1.4408			
Wetted parts materials	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819			
Measuring cell filling	Silicone oil or inert filling liquid			
Process connection	<ul style="list-style-type: none"> • Flanges as per EN and ASME • F&B and pharmaceutical flanges 			
Surface quality touched-by-media	R_a -values $\leq 0.8 \mu\text{m}$ (32 $\mu\text{-inch}$)/welds $R_a \leq 1.6 \mu\text{m}$ (64 $\mu\text{-inch}$) (Process connections acc. to 3A; R_a -values $\leq 0.8 \mu\text{m}$ (32 $\mu\text{-inch}$)/welds $R_a \leq 0.8 \mu\text{m}$ (32 $\mu\text{-inch}$))			

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

SITRANS P DS III series for gauge and absolute pressure, with front-flush diaphragm		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Power supply U_H		
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	Supplied through bus -
Separate 24 V power supply necessary	-	No
Bus voltage		
• Not Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Basic current (max.)	-	12.5 mA
• Start-up current \leq basic current	-	Yes
• Max. current in event of fault	-	15.5 mA
Fault disconnection electronics (FDE) available	-	Yes
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	
Explosion protection		
• Intrinsic safety "i"	PTB 13 ATEX 2007 X	
- Marking	Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +70 °C (-40 ... +158 °F) temperature class T5; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30$ V, $I_i = 100$ mA, $P_i = 750$ mW; $R_i = 300$ Ω	FISCO supply unit: $U_o = 17.5$ V, $I_o = 380$ mA, $P_o = 5.32$ W Linear barrier: $U_o = 24$ V, $I_o = 250$ mA, $P_o = 1.2$ W
- Effective internal inductance/capacitance	$L_i = 0.4$ mH, $C_i = 6$ nF	$L_i = 7$ μ H, $C_i = 1.1$ nF
• Explosion-proof "d"	PTB 99 ATEX 1160	
- Marking	Ex II 1/2 G Ex d IIC T4/T6 Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To circuits with values: $U_H = 10.5$... 45 V DC	To circuits with values: $U_H = 9$... 32 V DC
• Dust explosion protection for zone 20	PTB 01 ATEX 2055	
- Marking	Ex II 1 D IP65 T 120 °C Ex II 1/2 D IP65 T 120 °C	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	
- Max. surface temperature	120 °C (248 °F)	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30$ V, $I_i = 100$ mA, $P_i = 750$ mW, $R_i = 300$ Ω	FISCO supply unit: $U_o = 17.5$ V, $I_o = 380$ mA, $P_o = 5.32$ W Linear barrier: $U_o = 24$ V, $I_o = 250$ mA, $P_o = 1$ W
- Effective internal inductance/capacitance	$L_i = 0.4$ mH, $C_i = 6$ nF	$L_i = 7$ μ H, $C_i = 1.1$ nF
• Dust explosion protection for zone 21/22	PTB 01 ATEX 2055	
- Marking	Ex II 2 D IP65 T 120 °C	
- Connection	To circuits with values: $U_H = 10.5$... 45 V DC; $P_{max} = 1.2$ W	To circuits with values: $U_H = 9$... 32 V DC; $P_{max} = 1$ W
• Type of protection "n" (zone 2)	PTB 13 ATEX 2007 X	
- Marking	Ex II 2/3 G Ex nA II T4/T5/T6 Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc	
- Connection (Ex nA)	$U_m = 45$ V	$U_m = 32$ V
- Connections (Ex ic)	To circuits with values: $U_i = 45$ V	FISCO supply unit ic: $U_o = 17.5$ V, $I_o = 570$ mA Linear barrier: $U_o = 32$ V, $I_o = 132$ mA, $P_o = 1$ W
- Effective internal inductance/capacitance	$L_i = 0.4$ mH, $C_i = 6$ nF	$L_i = 7$ μ H, $C_i = 1.1$ nF

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

1

SITRANS P DS III series for gauge and absolute pressure, with front-flush diaphragm	
HART	PROFIBUS PA and FOUNDATION Fieldbus
Certificates and approvals (continued)	
<ul style="list-style-type: none"> Explosion protection acc. to FM <ul style="list-style-type: none"> Identification (XP/DIP) or (IS); (NI) Explosion protection to CSA <ul style="list-style-type: none"> Identification (XP/DIP) or (IS) 	<p>Certificate of Compliance 3008490</p> <p>CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III</p> <p>Certificate of Compliance 1153651</p> <p>CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III</p>

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.064 · r + 0.08) % / 28 °C (50 °F).

Hygiene version

In the case of SITRANS P DSIII with 7MF413x front-flush diaphragm, selected connections comply with the requirements of EHEDG.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

HART communication		FOUNDATION Fieldbus communication	
HART	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0, 1, or 2 (register operating mode and reset function for metering)	• PID	1 resource block
Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping, adjustable	0 ... 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input /Output		
- Failure mode	parameterizable (last good value, substitute value, incorrect value)		
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output		
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Square-rooted characteristic for flow measurement	Yes		
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

1

Selection and Ordering data		Article No.
Pressure transmitter for gauge and absolute pressure, front-flush diaphragm, SITRANS P DS III HART		7MF4133-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	1
Inert liquid	grease-free to cleanliness level 2	3
FDA compliant fill fluid		
• Neobee oil	normal	4
Measuring span (min. ... max.)		
0.01 ... 1 bar	(0.15 ... 14.5 psi)	B
0.04 ... 4 bar	(0.58 ... 58 psi)	C
0.16 ... 16 bar	(2.32 ... 232 psi)	D
0.63 ... 63 bar	(9.14 ... 914 psi)	E
43 ... 1300 mbar a ¹⁾	(0.62 ... 18.85 psia) ¹⁾	S
0.16 ... 5 bar a ¹⁾	(0.7 ... 72.5 psia) ¹⁾	T
1 ... 30 bar a ¹⁾	(4.35 ... 435 psia) ¹⁾	U
Wetted parts materials		
Seal diaphragm	Connection shank	
Stainless steel	Stainless steel	A
Hastelloy ²⁾	Stainless steel	B
Process connection		
• Flange version with Order code M., N., R. or Q..		7
Non-wetted parts materials		
• Housing made of die-cast aluminium		0
• Housing stainless steel precision casting		3
Version		
• Standard versions		1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)		2
Explosion protection		
• None		A
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"		B
- "Explosion-proof (Ex d)" ³⁾		D
- „Ex nA/ic (Zone 2)" ⁴⁾		E
• FM + CSA intrinsic safe (is)		F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ⁵⁾		S
• With FM + CSA, Type of protection:		
- "Intrinsic Safe und Explosion Proof (is + xp)" ³⁾		NC
Electrical connection/cable entry		
• Inner thread M20 x 1.5		B
• Female thread ½-14 NPT		C
• Han 7D plug (plastic housing) incl. mating connector ⁶⁾		D
• M12 connectors (stainless steel) ⁷⁾ 8)		F
Display		
• Without display		0
• Without visible display (display concealed, setting: mA)		1
• With visible display (setting: mA)		6
• With customer-specific display (setting as specified, Order code "Y21" or "Y22" required)		7

- 1) Not with temperature decoupler P00 and P10, not for process connections R02, R04, R10 and R11, and can only be ordered in conjunction with silicone oil.
- 2) Only available for flanges with options M., N. and Q..
- 3) Without cable gland, with blanking plug
- 4) Configurations with HAN and M12 connectors are only available in Ex ic.
- 5) Only in connection with IP65.
- 6) Only in connection with Ex approval A, B or E.
- 7) Only in connection with Ex approval A, B, E or F.
- 8) M12 delivered without cable socket

Power supply units see Chap. 7 "Supplementary Components".

Included in delivery of the device:

- Brief instructions (Leporello)
- CD-ROM with detailed documentation

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

Selection and Ordering data	Article No.
Pressure transmitter P for gauge and absolute pressure, front-flush diaphragm:	
SITRANS P DS III with PROFIBUS PA (PA)	7 M F 4 1 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 M F 4 1 3 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring cell filling	
Silicone oil	1
Inert liquid	3
FDA compliant fill fluid	
• Neobee oil	4
Measuring cell cleaning	
normal	
grease-free to cleanliness level 2	
Nominal measuring range	
1 bar (14.5 psi)	B
4 bar (58 psi)	C
16 bar (232 psi)	D
63 bar (914 psi)	E
1300 mbar a ¹⁾ (18.85 psia) ¹⁾	S
5 bar a ¹⁾ (72.5 psia) ¹⁾	T
30 bar a ¹⁾ (435 psia) ¹⁾	U
Wetted parts materials	
Seal diaphragm	
Connection shank	
Stainless steel	A
Hastelloy ²⁾	B
Process connection	
• Flange version with Order code M.., N.., R.. or Q..	7
Non-wetted parts materials	
• Housing made of die-cast aluminium	0
• Housing stainless steel precision casting	3
Version	
• Standard versions	1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	2
Explosion protection	
• None	A
• With ATEX, Type of protection:	
- "Intrinsic safety (Ex ia)"	B
- "Explosion-proof (Ex d)" ³⁾	D
- „Ex nA/ic (Zone 2)" ⁴⁾	E
• FM + CSA intrinsic safe (is)	F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ⁵⁾	S
• With FM + CSA, Type of protection:	
- "Intrinsic Safe und Explosion Proof (is + xp)" ³⁾ (Available soon)	NC
Electrical connection/cable entry	
• Screwed gland M20 x 1.5	B
• Screwed gland ½-14 NPT	C
• M12 connectors (stainless steel) ^{6) 7)}	F

Selection and Ordering data	Article No.
Pressure transmitter P for gauge and absolute pressure, front-flush diaphragm:	
SITRANS P DS III with PROFIBUS PA (PA)	7 M F 4 1 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 M F 4 1 3 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Display	
• Without display	0
• Without visible display (display concealed, setting: bar)	1
• With visible display (setting: bar)	6
• With customer-specific display (setting as specified, Order code "Y21" required)	7
Included in delivery of the device:	
• Brief instructions (Leporello)	
• CD-ROM with detailed documentation	
¹⁾ Not with temperature decoupler P00 and P10, not for process connections R01, R02, R04, R10 and R11, and can only be ordered in conjunction with silicone oil.	
²⁾ Only available for flanges with options M.., N.. and Q..	
³⁾ Without cable gland, with blanking plug	
⁴⁾ Configurations with HAN and M12 connectors are only available in Ex ic.	
⁵⁾ Only in connection with IP65.	
⁶⁾ Only in connection with Ex approval A, B, E or F.	
⁷⁾ M12 delivered without cable socket	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

1

Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Plug				
• Han 7D (metal)	A30	✓		
• Han 8D (instead of Han 7D)	A31	✓		
• Angled	A32	✓		
• Han 8D (metal)	A33	✓		
Cable sockets for M12 connectors (metal (CuZn))	A50	✓	✓	✓
Rating plate inscription (instead of German)				
• English	B11	✓	✓	✓
• French	B12	✓	✓	✓
• Spanish	B13	✓	✓	✓
• Italian	B14	✓	✓	✓
• Cyrillic (russian)	B16	✓	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	B21	✓	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	✓	✓	✓
Inspection certificate Acc. to EN 10204-3.1	C12	✓	✓	✓
Factory certificate Acc. to EN 10204-2.2	C14	✓	✓	✓
Functional safety (SIL2) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓		
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	C21 ¹⁾		✓	
Functional safety (SIL2/3) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓		
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request .)	C99	✓	✓	✓
Setting of upper limit of output signal to 22.0 mA	D05	✓		
Degree of protection IP66/IP68 (only for M20x1.5 and ½-14 NPT)	D12	✓	✓	✓
Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓	✓
Oxygen application (In the case of oxygen measurement and inert liquid max. 100 bar (1450 psi) at 60°C (140 °F))	E10	✓	✓	✓
Export approval Korea	E11	✓	✓	✓
CRN approval Canada (Canadian Registration Number)	E22	✓	✓	✓
Dual seal	E24	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25 ²⁾	✓	✓	✓
"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26 ²⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28 ²⁾	✓	✓	
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45 ²⁾	✓	✓	✓
Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46 ²⁾	✓	✓	✓
Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55 ²⁾	✓	✓	✓
Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56 ²⁾	✓	✓	✓
Ex protection "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57 ²⁾	✓	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58 ²⁾	✓	✓	✓
"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]..-Z + E11)	E70 ²⁾	✓	✓	✓
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓	✓
Flanges to EN 1092-1, Form B1				
• DN 25, PN 40 ³⁾	M11	✓	✓	✓
• DN 25, PN 100 ³⁾	M21	✓	✓	✓
• DN 40, PN 40	M13	✓	✓	✓
• DN 40, PN 100	M23	✓	✓	✓
• DN 50, PN 16	M04	✓	✓	✓
• DN 50, PN 40	M14	✓	✓	✓
• DN 80, PN 16	M06	✓	✓	✓
• DN 80, PN 40	M16	✓	✓	✓
Flanges to ASME B16.5				
• Stainless steel flange 1" class 150 ³⁾	M40	✓	✓	✓
• Stainless steel flange 1½" class 150	M41	✓	✓	✓
• Stainless steel flange 2" class 150	M42	✓	✓	✓
• Stainless steel flange 3" class 150	M43	✓	✓	✓
• Stainless steel flange 4" class 150	M44	✓	✓	✓
• Stainless steel flange 1" class 300 ³⁾	M45	✓	✓	✓
• Stainless steel flange 1½" class 300	M46	✓	✓	✓
• Stainless steel flange 2" class 300	M47	✓	✓	✓
• Stainless steel flange 3" class 300	M48	✓	✓	✓
• Stainless steel flange 4" class 300	M49	✓	✓	✓
Threaded connector to DIN 3852-2, form A, thread to ISO 228⁴⁾				
• G ¾"-A, front-flush	R01	✓	✓	✓
• G 1"-A, front-flush	R02	✓	✓	✓
• G 2"-A, front-flush	R04	✓	✓	✓
Tank connection⁵⁾ Sealing is included in delivery				
• TG 52/50, PN 40	R10	✓	✓	✓
• TG 52/150, PN 40	R11	✓	✓	✓
Sanitary process connection according DIN 11851 (Dairy connection with slotted union nut)				
• DN 50, PN 25	N04	✓	✓	✓
• DN 80, PN 25	N06	✓	✓	✓
Tri-Clamp connection according DIN 32676/ISO 2852				
• DN 50/2", PN 16	N14	✓	✓	✓
• DN 65/3", PN 10	N15	✓	✓	✓
Varivent connection Certified to EHEDG				
• Type N = 68 for Varivent housing DN 40 ... 125 und 1½" ... 6", PN 40	N28	✓	✓	✓

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

Selection and Ordering data	Order code			Selection and Ordering data	Order code		
<i>Further designs</i> Add "-Z" to Article No. and specify Order code.	HART	PA	FF	<i>Further designs</i> Add "-Z" to Article No. and specify Order code.	HART	PA	FF
Temperature decoupler up to 200 °C⁶⁾ for version with front-flush diaphragm	P00	✓	✓	Aseptic threaded socket to DIN 11864-1 Form A approved according to EHEDG			
Temperature decoupler up to 250 °C Measuring cell filling: High-temperature oil, only in conjunction with measuring cell filling silicone oil	P10	✓	✓	• DN 50, PN 25	N33	✓	✓
Sanitary process connection to DRD • DN 50, PN 40	M32	✓	✓	• DN 65, PN 25	N34	✓	✓
SMS socket with union nut				• DN 80, PN 25	N35	✓	✓
• 2"	M67	✓	✓	• DN 100, PN 25	N36	✓	✓
• 2½"	M68	✓	✓	Aseptic flange with notch to DIN 11864-2 Form A approved according to EHEDG			
• 3"	M69	✓	✓	• DN 50, PN 16	N43	✓	✓
SMS threaded socket				• DN 65, PN 16	N44	✓	✓
• 2"	M73	✓	✓	• DN 80, PN 16	N45	✓	✓
• 2½"	M74	✓	✓	• DN 100, PN 16	N46	✓	✓
• 3"	M75	✓	✓	Aseptic flange with groove to DIN 11864-2 Form A approved according to EHEDG			
IDF socket with union nut ISO 2853				• DN 50, PN 16	N43 + P11	✓	✓
• 2"	M82	✓	✓	• DN 65, PN 16	N44 + P11	✓	✓
• 2½"	M83	✓	✓	• DN 80, PN 16	N45 + P11	✓	✓
• 3"	M84	✓	✓	• DN 100, PN 16	N46 + P11	✓	✓
IDF threaded socket ISO 2853				Aseptic clamp with groove to DIN 11864-3 Form A approved according to EHEDG			
• 2"	M92	✓	✓	• DN 50, PN 25	N53	✓	✓
• 2½"	M93	✓	✓	• DN 65, PN 25	N54	✓	✓
• 3"	M94	✓	✓	• DN 80, PN 16	N55	✓	✓
Sanitary process connection to NEUMO Bio-Connect screw connection Certified to EHEDG				• DN 100, PN 16	N56	✓	✓
• DN 50, PN 16	Q05	✓	✓	¹⁾ Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H.			
• DN 65, PN 16	Q06	✓	✓	²⁾ Option does not include ATEX approval, but instead includes only the country-specific approval.			
• DN 80, PN 16	Q07	✓	✓	³⁾ Special seal in Viton included in the scope of delivery			
• DN 100, PN 16	Q08	✓	✓	⁴⁾ Lower measuring limit -100 mbar (1.45 psi).			
• DN 2", PN 16	Q13	✓	✓	⁵⁾ The weldable socket can be ordered under accessories.			
• DN 2½", PN 16	Q14	✓	✓	⁶⁾ Certified to 3A and EHEDG. The maximum permissible temperatures of the medium depend on the respective cell fillings (see medium conditions).			
• DN 3", PN 16	Q15	✓	✓				
• DN 4", PN 16	Q16	✓	✓				
Sanitary process connection to NEUMO Bio-Connect flange connection Certified to EHEDG							
• DN 50, PN 16	Q23	✓	✓				
• DN 65, PN 16	Q24	✓	✓				
• DN 80, PN 16	Q25	✓	✓				
• DN 100, PN 16	Q26	✓	✓				
• DN 2", PN 16	Q31	✓	✓				
• DN 2½", PN 16	Q32	✓	✓				
• DN 3", PN 16	Q33	✓	✓				
• DN 4", PN 16	Q34	✓	✓				
Sanitary process connection to NEUMO Bio-Connect clamp connection Certified to EHEDG							
• DN 50, PN 16	Q39	✓	✓				
• DN 65, PN 10	Q40	✓	✓				
• DN 80, PN 10	Q41	✓	✓				
• DN 100, PN 10	Q42	✓	✓				
• DN 2½", PN 16	Q48	✓	✓				
• DN 3", PN 10	Q49	✓	✓				
• DN 4", PN 10	Q50	✓	✓				
Sanitary process connection to NEUMO Bio-Connect S flange connection Certified to EHEDG							
• DN 2", PN 16	Q72	✓	✓				

Selection and Ordering data	Order code			
Additional data		HART	PA	FF
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ ¹⁾	
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 characters, specify in plain text: Y16:	Y16	✓	✓	✓
Entry of HART address (TAG) Max. 8 characters, specify in plain text: Y17:	Y17	✓		
Setting of pressure indicator in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O ¹⁾ , inH ₂ O ¹⁾ , ftH ₂ O ¹⁾ , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % ¹⁾ ref. temperature 20 °C	Y21	✓	✓	✓
Setting of pressure indication in non-pressure units²⁾ Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	Y22 + Y01	✓		
Preset bus address possible between 1 and 126 Specify in plain text: Y25:	Y25		✓	✓
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓

Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset

✓ = available

ordering example

Item line: 7MF4133-1DB20-1AB7-Z
 B line: A22 + Y01 + Y21
 C line: Y01: 1 ... 10 bar (14.5 ... 145 psi)
 C line: Y21: bar (psi)

¹⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

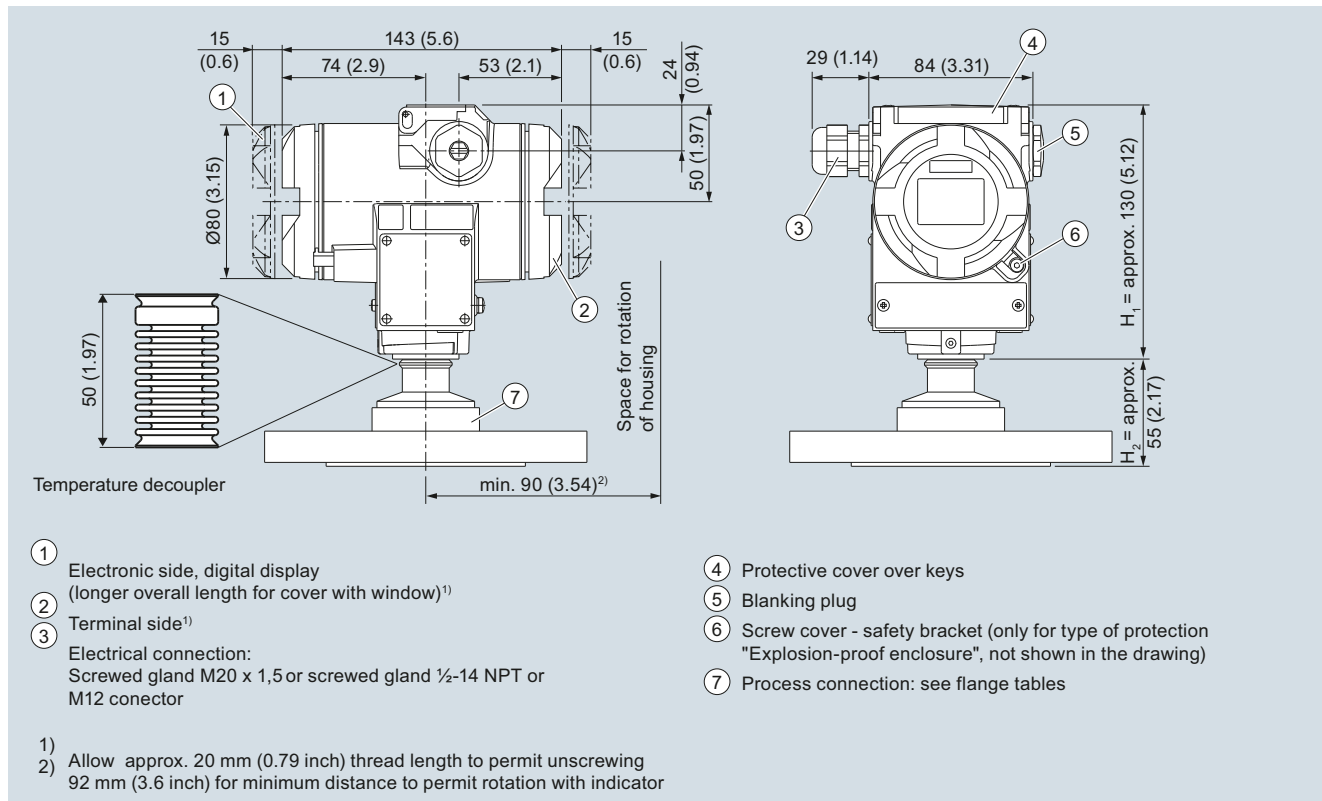
²⁾ Preset values can only be changed over SIMATIC PDM.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

Dimensional drawings



SITRANS P pressure transmitters, DS III series for gauge pressure, with front-flush diaphragm, dimensions in mm (inch)

The diagram shows a SITRANS P DS III with an example of a flange. In this drawing the height is subdivided into H₁ and H₂.

H₁ = Height of the SITRANS P300 up to a defined cross-section

H₂ = Height of the flange up to this defined cross-section

Only the height H₂ is indicated in the dimensions of the flanges.

Pressure Measurement

Transmitters for general requirements

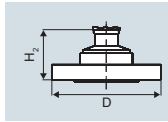
SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

1

Flanges as per EN and ASME

Flange to EN

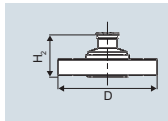
EN 1092-1



Order code	DN	PN	ØD	H ₂
M11	25	40	115 mm (4.5")	Approx. 52 mm (2")
M21	25	100	140 mm (5.5")	
M13	40	40	150 mm (5.9")	
M23	40	100	170 mm (6.7")	
M04	50	16	165 mm (6.5")	
M14	50	40	165 mm (6.5")	
M06	80	16	200 mm (7.9")	
M16	80	40	200 mm (7.9")	

Flanges to ASME

ASME B16.5

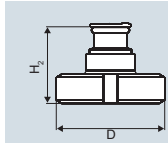


Order code	DN	PN	ØD	H ₂
M40	1"	150	110 mm (4.3")	Approx. 52 mm (2")
M41	1½"	150	130 mm (5.1")	
M42	2"	150	150 mm (5.9")	
M43	3"	150	190 mm (7.5")	
M44	4"	150	230 mm (9.1")	
M45	1"	300	125 mm (4.9")	
M46	1½"	300	155 mm (6.1")	
M47	2"	300	165 mm (6.5")	
M48	3"	300	210 mm (8.1")	
M49	4"	300	255 mm (10.0")	

NuG and pharmaceutical connections

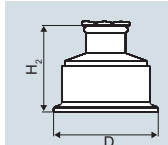
Connections to DIN

DIN 11851 (milk pipe union with slotted union nut)



Order code	DN	PN	ØD	H ₂
N04	50	25	92 mm (3.6")	Approx. 52 mm (2")
N06	80	25	127 mm (5.0")	

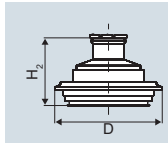
Tri-Clamp nach DIN 32676



Order code	DN	PN	ØD	H ₂
N14	50	16	64 mm (2.5")	Approx. 52 mm (2")
N15	65	10	91 mm (3.6")	

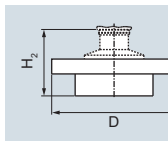
Other connections

Varivent connection



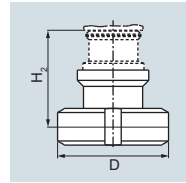
Order code	DN	PN	ØD	H ₂
N28	40 ... 125	40	84 mm (3.3")	Approx. 52 mm (2")

Sanitary process connection to DRD



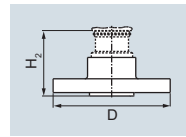
Order code	DN	PN	ØD	H ₂
M32	50	40	105 mm (4.1")	Approx. 52 mm (2")

Sanitary process screw connection to NEUMO Bio-Connect



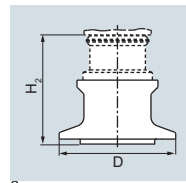
Order code	DN	PN	ØD	H ₂
Q05	50	16	82 mm (3.2")	Approx. 52 mm (2")
Q06	65	16	105 mm (4.1")	
Q07	80	16	115 mm (4.5")	
Q08	100	16	145 mm (5.7")	
Q13	2"	16	82 mm (3.2")	
Q14	2½"	16	105 mm (4.1")	
Q15	3"	16	105 mm (4.1")	
Q16	4"	16	145 mm (5.7")	

Sanitary process connection to NEUMO Bio-Connect flange connection



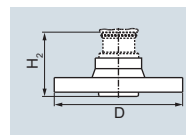
Order code	DN	PN	ØD	H ₂
Q23	50	16	110 mm (4.3")	Approx. 52 mm (2")
Q24	65	16	140 mm (5.5")	
Q25	80	16	150 mm (5.9")	
Q26	100	16	175 mm (6.9")	
Q31	2"	16	100 mm (3.9")	
Q32	2½"	16	110 mm (4.3")	
Q33	3"	16	140 mm (5.5")	
Q34	4"	16	175 mm (6.9")	

Sanitary process connection to NEUMO Bio-Connect clamp connection



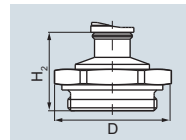
Order code	DN	PN	ØD	H ₂
Q39	50	16	77.4 mm (3.0")	Approx. 52 mm (2")
Q40	65	10	90.9 mm (3.6")	
Q41	80	10	106 mm (4.2")	
Q42	100	10	119 mm (4.7")	
Q47	2"	16	77.4 mm (3.0")	
Q48	2½"	16	90.9 mm (3.6")	
Q49	3"	10	106 mm (4.2")	
Q50	4"	10	119 mm (4.7")	

Sanitary process connection to NEUMO Bio-Connect S flange connection



Order code	DN	PN	ØD	H ₂
Q72	2"	16	125 mm (4.9")	Approx. 52 mm (2")

Threaded connection G¾", G1" and G2" acc. to DIN 3852



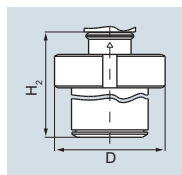
Order code	DN	PN	ØD	H ₂
R01	¾"	60	37 mm (1.5")	Approx. 45 mm (1.8") Approx. 47 mm (1.9") Approx. 52 mm (2")
R02	1"	60	48 mm (1.9")	
R04	2"	60	78 mm (3.1")	

Pressure Measurement

Transmitters for general requirements

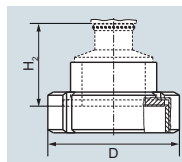
SITRANS P DS III for gauge/absolute pressure, with front-flush diaphragm

Tank connection TG 52/50 and TG52/150



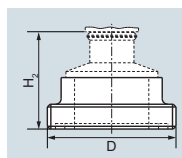
Order code	DN	PN	ØD	H ₂
R10	25	40	63 mm (2.5")	Approx. 63 mm (2.5")
R11	25	40	63 mm (2.5")	Approx. 170 mm (6.7")

SMS socket with union nut



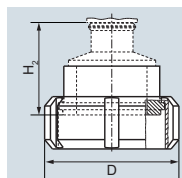
Order code	DN	PN	ØD	H ₂
M67	2"	25	84 mm (3.3")	Approx. 52 mm (2")
M68	2½"	25	100 mm (3.9")	
M69	3"	25	114 mm (4.5")	

SMS threaded socket



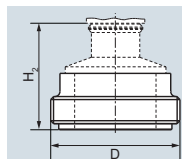
Order code	DN	PN	ØD	H ₂
M73	2"	25	70 x 1/6 mm	Approx. 52 mm (2")
M74	2½"	25	85 x 1/6 mm	
M75	3"	25	98 x 1/6 mm	

IDF socket with union nut



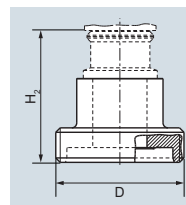
Order code	DN	PN	ØD	H ₂
M82	2"	25	77 mm (3")	Approx. 52 mm (2")
M83	2½"	25	91 mm (3.6")	
M84	3"	25	106 mm (4.2")	

IDF threaded socket



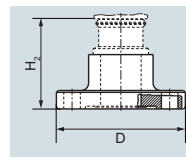
Order code	DN	PN	ØD	H ₂
M92	2"	25	64 mm (2.5")	Approx. 52 mm (2")
M93	2½"	25	77.5 mm (3.1")	
M94	3"	25	91 mm (3.6")	

Aseptic threaded socket to DIN 11864-1 Form A



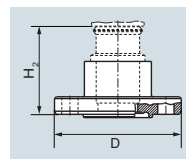
Order code	DN	PN	ØD	H ₂
N33	50	25	78 x 1/6"	Approx. 52 mm (2")
N34	65	25	95 x 1/6"	
N35	80	25	110 x 1/4"	
N36	100	25	130 x 1/4"	

Aseptic flange with notch to DIN 11864-2 Form A



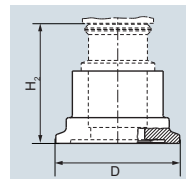
Order code	DN	PN	ØD	H ₂
N43	50	16	94	Approx. 52 mm (2")
N44	65	16	113	
N45	80	16	133	
N46	100	16	159	

Aseptic flange with groove to DIN 11864-2 Form A



Order code	DN	PN	ØD	H ₂
N43 + P11	50	16	94	Approx. 52 mm (2")
N44 + P11	65	16	113	
N45 + P11	80	16	133	
N46 + P11	100	16	159	

Aseptic clamp with groove to DIN 11864-3 Form A



Order code	DN	PN	ØD	H ₂
N53	50	25	77.5	Approx. 52 mm (2")
N54	65	25	91	
N55	80	16	106	
N56	100	16	130	

Technical specifications

SITRANS P DS III series for absolute pressure (from the gauge pressure series)

	HART	PROFIBUS PA and FOUNDATION Fieldbus		
Input	Absolute pressure			
Measured variable	Absolute pressure			
Spans (infinitely adjustable) or nominal measuring range and max. permissible test pressure	Span (min. ... max.)	Max. perm. test pressure	Nominal measuring range	Max. perm. test pressure
	8.3 ... 250 mbar a (0.12 ... 3.62 psia)	6 bar a (87 psia)	250 mbar a (3.6 psia)	6 bar a (87 psia)
	43 ... 1300 mbar a (0.62 ... 18.85 psi a)	10 bar a (145 psia)	1300 mbar a (18.9 psi a)	10 bar a (145 psia)
	160 ... 5000 mbar a (2.32 ... 72.5 psia)	30 bar a (435 psia)	5 bar a (72.5 psia)	30 bar a (435 psia)
	1 ... 30 bar a (14.5 ... 435 psia)	100 bar a (1450 psia)	30 bar a (435 psia)	100 bar a (1450 psia)
Lower measuring limit	0 mbar a (0 psia)			
• Measuring cell with silicone oil filling	100 % of max. span			
Upper measuring limit	100 % of max. span			
Output				
Output signal	4 ... 20 mA	Digital PROFIBUS PA and FOUNDATION Fieldbus signal		
• Lower limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA	-		
• Upper limit (infinitely adjustable)	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA	-		
Load				
• Without HART	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in Ω , U_H : Power supply in V	-		
• With HART	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)	-		
Physical bus	-	IEC 61158-2		
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy	Acc. to IEC 60770-1			
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)			
	Span ratio $r = \text{max. span}/\text{set span}$	Nominal measuring range ratio $r = \text{nominal measuring range}/\text{set measuring range}$		
Error in measurement at limit setting incl. hysteresis and reproducibility				
• Linear characteristic				
- $r \leq 10$	$\leq 0.1 \%$	$\leq 0.1 \%$		
- $10 < r \leq 30$	$\leq 0.2 \%$	$\leq 0.2 \%$		
Long-term stability (temperature change $\pm 30 \text{ °C}$ ($\pm 54 \text{ °F}$))	$\leq (0.1 \cdot r) \%$ /year	$\leq (0.1 \cdot r) \%$ /year		
Influence of ambient temperature				
• at -10 ... +60 °C (14 ... 140 °F)	$\leq (0.1 \cdot r + 0.2) \%^{1)}$	$\leq (0.1 \cdot r + 0.2) \%^{1)}$		
• at -40 ... -10 °C and 60 ... 85 °C (-40 ... +14 °F and 140 ... 185 °F)	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$		
Measured Value Resolution	-	$3 \cdot 10^{-5}$ of nominal measuring range		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from gauge pressure series)

SITRANS P DS III series for absolute pressure (from the gauge pressure series)		HART	PROFIBUS PA and FOUNDATION Fieldbus
Rated conditions			
Degree of protection (to IEC 60529)		IP66 (optional IP66/IP68), NEMA 4X	
Temperature of medium		-40 ... +100 °C (-40 ... +212 °F)	
• Measuring cell with silicone oil filling		-20 ... +100 °C (-4 ... +212 °F) with 30 bar a measuring cell	
• Measuring cell with inert filling liquid		-20 ... +100 °C (-4 ... +212 °F)	
• In conjunction with dust explosion protection		-20 ... +60 °C (-4 ... +140 °F)	
Ambient conditions			
• Ambient temperature		-40 ... +85 °C (-40 ... +185 °F)	
- Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics)		-40 ... +85 °C (-40 ... +185 °F)	
- Display readable		-30 ... +85 °C (-22 ... +185 °F)	
• Storage temperature		-50 ... +85 °C (-58 ... +185 °F)	
• Climatic class		Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics	
- Condensation			
• Electromagnetic Compatibility		Acc. to IEC 61326 and NAMUR NE 21	
- Emitted interference and interference immunity			
Design			
Weight (without options)		≈ 1.5 kg (≈ 3.3 lb)	
Enclosure material		Low-copper die-cast aluminum, GD-AlSi 12 or stainless steel precision casting, mat. no. 1.4408	
Wetted parts materials			
• Connection shank		Stainless steel, mat. no. 1.4404/316L or Hastelloy C4, mat. no. 2.4610	
• Oval flange		Stainless steel, mat. no. 1.4404/316L	
• Seal diaphragm		Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819	
Measuring cell filling		Silicone oil or inert filling liquid (maximum value with oxygen measurement pressure 100 bar (1450 psi) at 60 °C (140 °F))	
Process connection		Connection shank G $\frac{1}{2}$ B to EN 837-1, female thread $\frac{1}{2}$ -14 NPT or oval flange (PN 160 (MAWP 2320 psia)) to DIN 19213 with mounting thread M10 or $\frac{7}{16}$ -20 UNF to IEC 61518	
Material of mounting bracket			
• Steel		Sheet-steel, Mat. No. 1.0330, chrome-plated	
• Stainless steel		Sheet stainless steel, mat. no. 1.4301 (SS 304)	
Power supply U_H			Supplied through bus
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode		-
Separate 24 V power supply necessary	-		No
Bus voltage			
• Not Ex	-		9 ... 32 V
• With intrinsically-safe operation	-		9 ... 24 V
Current consumption			
• Basic current (max.)	-		12.5 mA
• Start-up current \leq basic current	-		Yes
• Max. current in event of fault	-		15.5 mA
Fault disconnection electronics (FDE) available	-		Yes

SITRANS P DS III series for absolute pressure (from the gauge pressure series)	HART	PROFIBUS PA and FOUNDATION Fieldbus
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	
Explosion protection		
• Intrinsic safety "i"	PTB 13 ATEX 2007 X	
- Marking	Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +70 °C (-40 ... +158 °F) temperature class T5; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$; $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion-proof "d"	PTB 99 ATEX 1160	
- Marking	Ex II 1/2 G Ex d IIC T4/T6 Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$
• Dust explosion protection for zone 20	PTB 01 ATEX 2055	
- Marking	Ex II 1 D IP65 T 120 °C Ex II 1/2 D IP65 T 120 °C	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	
- Max. surface temperature	120 °C (248 °F)	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Dust explosion protection for zone 21/22	PTB 01 ATEX 2055	
- Marking	Ex II 2 D IP65 T 120 °C	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$; $P_{\max} = 1.2 \text{ W}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$; $P_{\max} = 1 \text{ W}$
• Type of protection "n" (zone 2)	PTB 13 ATEX 2007 X	
- Marking	Ex II 2/3 G Ex nA II T4/T5/T6 Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc	
- Connection (Ex nA)	$U_m = 45 \text{ V}$	$U_m = 32 \text{ V}$
- Connection (Ex ic)	To circuits with values: $U_i = 45 \text{ V}$	FISCO supply unit ic: $U_o = 17.5 \text{ V}$, $I_o = 570 \text{ mA}$ Linear barrier: $U_o = 32 \text{ V}$, $I_o = 132 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion protection acc. to FM	Certificate of Compliance 3008490	
- Identification (XP/DIP) or (IS); (NI)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	
• Explosion protection to CSA	Certificate of Compliance 1153651	
- Identification (XP/DIP) or (IS)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.08. r + 0.16) % / 28 °C (50 °F).

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from gauge pressure series)

HART communication		FOUNDATION Fieldbus communication	
HART	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0, 1, or 2 (register operating mode and reset function for metering)	• PID	1 resource block
Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping, adjustable	0 to 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input /Output		
- Failure mode	parameterizable (last good value, substitute value, incorrect value)		
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output		
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Square-rooted characteristic for flow measurement	Yes		
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from gauge pressure series)

1

Selection and Ordering data		Article No.	Selection and Ordering data		Article No.
Pressure transmitters for absolute pressure from gauge pressure series SITRANS P DS III with HART		7MF4233-	Pressure transmitters for absolute pressure from gauge pressure series SITRANS P DS III with HART		7MF4233-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Display		
Measuring cell filling	Measuring cell cleaning		<ul style="list-style-type: none"> Without display Without visible display (display concealed, setting: mA) With visible display (setting: mA) With customer-specific display (setting as specified, Order code "Y21" or "Y22" required) 	<ul style="list-style-type: none"> 0 1 6 7 	
Silicone oil	normal	1	<ul style="list-style-type: none"> We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix. 		
Inert liquid ¹⁾	grease-free to cleanliness level 2	3	Power supply units see Chap. 7 "Supplementary Components".		
Measuring span (min. ... max.)			Included in delivery of the device: <ul style="list-style-type: none"> Brief instructions (Leporello) CD-ROM with detailed documentation 		
8.3 ... 250 mbar a	(0.12 ... 3.62 psia)	D	<ol style="list-style-type: none"> For oxygen application, add Order code E10. Version 7MF4233-1DY... only up to max. span 200 mbar a (80 inH₂O a). When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here. If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF423-..Y.-... and 7MF4900-1...-B The standard measuring cell filling for configurations with remote seals (Y) is silicone oil. Not in conjunction with Electrical connection "Screwed gland Pg 13.5" and "Han7D plug". Without cable gland, with blanking plug. With enclosed cable gland Ex ia and blanking plug. Configurations with HAN and M12 connectors are only available in Ex ic. Only in connection with IP65. Only in connection with Ex approval A, B or E. Only in connection with Ex approval A, B, E or F. M12 delivered without cable socket 		
43 ... 1300 mbar a	(0.62 ... 18.85 psia)	F			
0.16 ... 5 bar a	(2.32 ... 72.5 psia)	G			
1 ... 30 bar a	(14.5 ... 435 psia)	H			
Wetted parts materials					
Seal diaphragm	Process connection				
Stainless steel	Stainless steel	A			
Hastelloy	Stainless steel	B			
Hastelloy	Hastelloy	C			
Version for diaphragm seal ^{2) 3) 4) 5) 6)}		Y			
Process connection					
<ul style="list-style-type: none"> Connection shank G$\frac{1}{2}$B to EN 837-1 Female thread $\frac{1}{2}$-14 NPT Stainless steel oval flange with process connection (Oval flange has no female thread) <ul style="list-style-type: none"> Mounting thread $\frac{7}{16}$-20 UNF to EN 61518 Mounting thread M10 to DIN 19213 Mounting thread M12 to DIN 19213 Male thread M20 x 1.5 Male thread $\frac{1}{2}$-14 NPT 		0			
			1		
			2		
			3		
			4		
			5		
			6		
Non-wetted parts materials					
<ul style="list-style-type: none"> Housing made of die-cast aluminium Housing stainless steel precision casting⁷⁾ 		0			
		3			
Version					
<ul style="list-style-type: none"> Standard versions International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		1			
		2			
Explosion protection					
<ul style="list-style-type: none"> None With ATEX, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety (Ex ia)" "Explosion-proof (Ex d)⁸⁾ "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)⁹⁾ "Ex nA/ic (Zone 2)¹⁰⁾ "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)⁹⁾¹¹⁾ FM + CSA intrinsic safe (is) FM + CSA (is + ep) + Ex ia + Ex d (ATEX)¹¹⁾ With FM + CSA, Type of protection: <ul style="list-style-type: none"> "Intrinsic Safe und Explosion Proof (is + xp)⁸⁾ 		A			
			B		
			D		
			P		
			E		
			R		
			F		
			S		
			NC		
Electrical connection/cable entry					
<ul style="list-style-type: none"> Screwed gland Pg 13.5¹²⁾ Screwed gland M20x1.5 Screwed gland $\frac{1}{2}$-14 NPT Han 7D plug (plastic housing) incl. mating connector¹²⁾ M12 connectors (stainless steel)^{13) 14)} 		A			
			B		
			C		
			D		
			F		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from gauge pressure series)

Selection and Ordering data	Article No.
Pressure transmitters for absolute pressure from gauge pressure series	
SITRANS P DS III with PROFIBUS PA (PA)	7 M F 4 2 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 M F 4 2 3 5 -
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring cell filling	
Silicone oil	1
Inert liquid ¹⁾	3
Measuring cell cleaning	
normal	D
grease-free to cleanliness level 2	F
	G
	H
Nominal measuring range	
250 mbar a (3.62 psia)	D
1300 mbar a (18.85 psia)	F
5 bar a (72.5 psia)	G
30 bar a (435 psia)	H
Wetted parts materials	
Seal diaphragm	
Process connection	
Stainless steel	A
Hastelloy	B
Hastelloy	C
Version as diaphragm seal ^{2) 3) 4) 5) 6)}	Y
Process connection	
• Connection shank G $\frac{1}{2}$ B to EN 837-1	0
• Female thread $\frac{1}{2}$ -14 NPT	1
• Stainless steel oval flange with process connection (Oval flange has no female thread)	
- Mounting thread $\frac{7}{16}$ -20 UNF to IEC 61518	2
- Mounting thread M10 to DIN 19213	3
- Mounting thread M12 to DIN 19213	4
• Male thread M20 x 1.5	5
• Male thread $\frac{1}{2}$ -14 NPT	6
Non-wetted parts materials	
• Housing made of die-cast aluminium	0
• Housing stainless steel precision casting	3
Version	
• Standard versions	1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	2
Explosion protection	
• None	A
• With ATEX, Type of protection:	
- "Intrinsic safety (Ex ia)"	B
- "Explosion-proof (Ex d)" ⁷⁾	D
- "Intrinsic safety and flameproof enclosure (Ex ia + Ex d)" ⁸⁾	P
- "Ex nA/ic (Zone 2)" ⁹⁾	E
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" ^{8) 10)} (not for DS III FF)	R
• FM + CSA intrinsic safe (is)	F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ¹⁰⁾	S
• With FM + CSA, Type of protection:	
- "Intrinsic Safe und Explosion Proof (is + xp)" ⁷⁾	NC
Electrical connection/cable entry	
• Screwed gland M20 x 1.5	B
• Screwed gland $\frac{1}{2}$ -14 NPT	C
• M12 connectors (stainless steel) ^{11) 12)}	F

Selection and Ordering data	Article No.
Pressure transmitters for absolute pressure from gauge pressure series	
SITRANS P DS III with PROFIBUS PA (PA)	7 M F 4 2 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 M F 4 2 3 5 -
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Display	
• Without display	0
• Without visible display (display concealed, setting: bar)	1
• With visible display (setting: bar)	6
• with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)	7
Included in delivery of the device:	
• Brief instructions (Leporello)	
• CD-ROM with detailed documentation	
¹⁾ For oxygen application, add Order code E10.	
²⁾ Version 7MF4233-1DY... only up to max. span 200 mbar a (2.9 psia).	
³⁾ When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here.	
⁴⁾ If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.	
⁵⁾ The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF423-..Y-.... and 7MF4900-1...-B	
⁶⁾ The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.	
⁷⁾ Without cable gland, with blanking plug.	
⁸⁾ With enclosed cable gland Ex ia and blanking plug.	
⁹⁾ Configurations with HAN and M12 connectors are only available in Ex ic.	
¹⁰⁾ Only in connection with IP65.	
¹¹⁾ Only in connection with Ex approval A, B, E or F.	
¹²⁾ M12 delivered without cable socket.	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from gauge pressure series)

1

Selection and Ordering data	Order code			
Further designs		HART	PA	FF
Add "-Z" to Article No. and specify Order code.				
Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:				
• Steel	◆ A01	✓	✓	✓
• Stainless steel	◆ A02	✓	✓	✓
Plug				
• Han 7D (metal)	A30	✓		
• Han 8D (instead of Han 7D)	A31	✓		
• Angled	A32	✓		
• Han 8D (metal)	A33	✓		
Cable sockets for M12 connectors (metal (CuZn))	A50	✓	✓	✓
Rating plate inscription (instead of German)				
• English	◆ B11	✓	✓	✓
• French	◆ B12	✓	✓	✓
• Spanish	◆ B13	✓	✓	✓
• Italian	◆ B14	✓	✓	✓
• Cyrillic (russian)	◆ B16	✓	✓	✓
English rating plate	◆ B21	✓	✓	✓
Pressure units in inH ₂ O and/or psi				
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2¹⁾	◆ C11	✓	✓	✓
Inspection certificate²⁾	◆ C12	✓	✓	✓
Acc. to EN 10204-3.1				
Factory certificate	◆ C14	✓	✓	✓
Acc. to EN 10204-2.2				
Functional safety (SIL2)	◆ C20	✓		
Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration				
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	C21 ³⁾		✓	
Functional safety (SIL2/3)	◆ C23	✓		
Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration				
Device passport Russia	C99	✓	✓	✓
(For price request please contact the technical support www.siemens.com/automation/support-request)				
Setting of upper limit of output signal to 22.0 mA	D05	✓		
Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009)	D07	✓	✓	✓
Degree of protection IP66/IP68 (only for M20 x 1.5 and ½-14 NPT)	D12	✓	✓	✓
Supplied with oval flange (1 item), PTFE packing and screws in thread of oval flange	D37	✓	✓	✓
Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓	✓

Selection and Ordering data	Order code			
Further designs		HART	PA	FF
Add "-Z" to Article No. and specify Order code.				
Use in or on zone 1D/2D	E01	✓	✓	✓
(only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B.. Ex ia)" and IP65)				
Oxygen application	E10	✓	✓	✓
(In the case of oxygen measurement and inert liquid max. 100 bar (1450 psi) at 60°C (140 °F))				
Export approval Korea	E11	✓	✓	✓
CRN approval Canada (Canadian Registration Number)	E22	✓	✓	✓
Dual seal	E24	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25 ⁴⁾	✓	✓	✓
"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26 ⁴⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28 ⁴⁾	✓	✓	
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45 ⁴⁾	✓	✓	✓
Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46 ⁴⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55 ⁴⁾	✓	✓	✓
Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56 ⁴⁾	✓	✓	✓
Explosion-proof "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57 ⁴⁾	✓	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58 ⁴⁾	✓	✓	✓
"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]...-Z + E11)	E70 ⁴⁾	✓	✓	✓
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓	✓
Oval flange NAM (ASTAVA)	J06	✓	✓	✓

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

¹⁾ When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.

²⁾ If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.

³⁾ Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H

⁴⁾ Option does not include ATEX approval, but instead includes only the country-specific approval.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from gauge pressure series)

1

Selection and Ordering data	Order code			
Additional data		HART	PA	FF
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	◆ Y01	✓	✓ ¹⁾	
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	◆ Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 characters, specify in plain text: Y16:	◆ Y16	✓	✓	✓
Entry of HART address (TAG) Max. 8 characters, specify in plain text: Y17:	◆ Y17	✓		
Setting of pressure indication in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O ^{*)} , inH ₂ O ^{*)} , ftH ₂ O ^{*)} , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % *) ref. temperature 20 °C	◆ Y21	✓	✓	✓
Setting of pressure indication in non-pressure units²⁾ Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	◆ Y22 + Y01	✓		
Preset bus address possible between 1 and 126 Specify in plain text: Y25:	Y25		✓	✓
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Factory mounting of valve manifolds, see accessories.

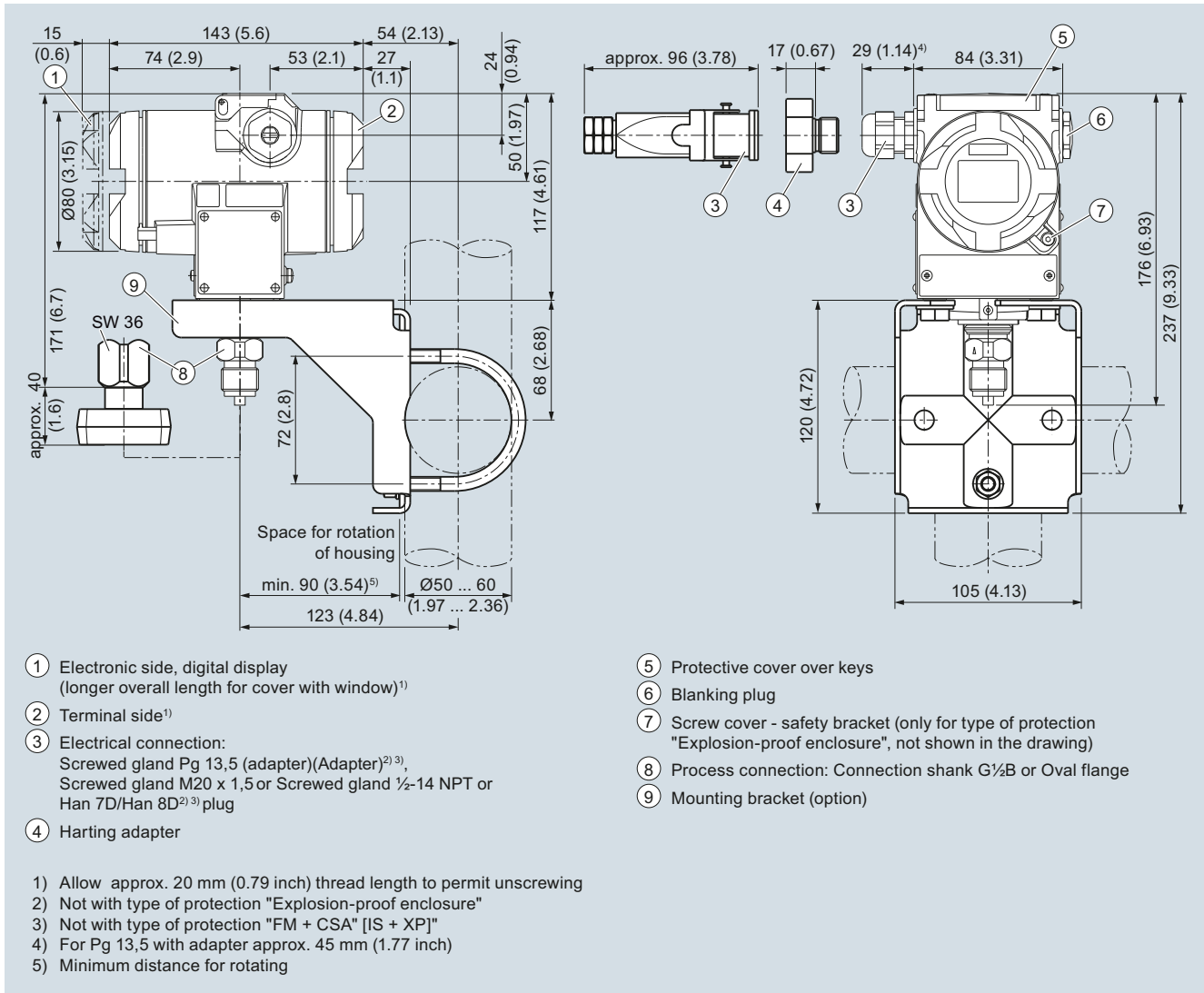
Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset

✓ = available

¹⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

²⁾ Preset values can only be changed over SIMATIC PDM.

Dimensional drawings



SITRANS P DS III pressure transmitters for absolute pressure, from the pressure series, dimensions in mm (inch)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

Technical specifications

SITRANS P, DS III for absolute pressure (from the differential pressure series)

	HART	PROFIBUS PA and FOUNDATION Fieldbus		
Input	Absolute pressure			
Measured variable	Absolute pressure			
Spans (infinitely adjustable) or nominal measuring range and max. permissible operating pressure	Span (min. ... max.)	Maximum operating pressure	Nominal measuring range	Maximum operating pressure
	8.3 ... 250 mbar a (0.12 ... 3.62 psia)	32 bar a (464 psia)	250 mbar a (3.62 psia)	32 bar a (464 psia)
	43 ... 1300 mbar a (0.62 ... 18.85 psia)	32 bar a (464 psia)	1300 bar a (18.85 psia)	32 bar a (464 psia)
	160 ... 5000 mbar a (2.32 ... 72.52 psia)	32 bar a (464 psia)	5 bar a (72.5 psia)	32 bar a (464 psia)
	1 ... 30 bar a (14.5 ... 435 psia)	160 bar a (2320 psia)	30 bar a (435 psia)	160 bar a (2320 psia)
	5.3 ... 100 bar a (76.9 ... 1450 psia)	160 bar a (2320 psia) (for connection thread M10 and 7/16-20 UNF in the process flanges)	100 bar a (1450 psia)	160 bar a (2320 psia) (for connection thread M10 and 7/16-20 UNF in the process flanges)
Lower measuring limit	0 mbar a (0 psia)			
• Measuring cell with silicone oil filling	100 % of max. span			
Upper measuring limit	100 % of max. span			
Output				
Output signal	4 ... 20 mA	Digital PROFIBUS PA and FOUNDATION Fieldbus signal		
• Lower limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA	-		
• Upper limit (infinitely adjustable)	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA	-		
Load				
• Without HART	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in Ω , U_H : Power supply in V	-		
• With HART	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)	-		
Physical bus	-	IEC 61158-2		
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy	Acc. to IEC 60770-1			
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)			
	Span ratio $r = \text{max. span}/\text{set span}$	Nominal measuring range ratio $r = \text{nominal measuring range}/\text{set measuring range}$		
Error in measurement at limit setting incl. hysteresis and reproducibility				
• Linear characteristic				
- $r \leq 10$	$\leq 0.1 \%$	$\leq 0.1 \%$		
- $10 < r \leq 30$	$\leq 0.2 \%$	$\leq 0.2 \%$		
Long-term stability (temperature change $\pm 30 \text{ °C}$ ($\pm 54 \text{ °F}$))	$\leq (0.1 \cdot r) \%/ \text{year}$	$\leq (0.1 \cdot r) \%/ \text{year}$		
Influence of ambient temperature				
• at -10 ... +60 °C (14 ... 140 °F)	$\leq (0.1 \cdot r + 0.2) \%^{1)}$	$\leq (0.1 \cdot r + 0.2) \%^{1)}$		
• at -40 ... -10 °C and 60 ... 85 °C (-40 ... +14 °F and 140 ... 185 °F)	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$	$\leq (0.1 \cdot r + 0.15) \%/10 \text{ K}$		
Measured Value Resolution	-	$3 \cdot 10^{-5}$ of nominal measuring range		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

1

SITRANS P, DS III for absolute pressure (from the differential pressure series)		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Rated conditions		
Degree of protection (to IEC 60529)	IP66 (optional IP66/IP68), NEMA 4X	
Temperature of medium		
• Measuring cell with silicone oil filling	-40 ... +100 °C (-40 ... +212 °F)	
• Measuring cell with inert filling liquid	-20 ... +100 °C (-4 ... +212 °F)	
• In conjunction with dust explosion protection	-20 ... +60 °C (-4 ... +140 °F)	
Ambient conditions		
• Ambient temperature		
- Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics)	-40 ... +85 °C (-40 ... +185 °F)	
- Display readable	-30 ... +85 °C (-22 ... +185 °F)	
• Storage temperature	-50 ... +85 °C (-58 ... +185 °F)	
• Climatic class		
- Condensation	Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics	
• Electromagnetic Compatibility		
- Emitted interference and interference immunity	Acc. to IEC 61326 and NAMUR NE 21	
Design		
Weight (without options)	≈ 4.5 kg (≈ 9.9 (lb))	
Enclosure material	Low-copper die-cast aluminum, GD-AISI12 or stainless steel precision casting, mat. no. 1.4408	
Wetted parts materials		
• Seal diaphragm	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819, Monel, mat. no. 2.4360, tantalum or gold	
• Process flanges and sealing screw	Stainless steel, mat. no. 1.4408, Hastelloy C4, mat. no. 2.4610 or Monel, mat. no. 2.4360	
• O-Ring	FPM (Viton) or optionally: PTFE, FEP, FEPM and NBR	
Measuring cell filling	Silicone oil or inert filling liquid (maximum value with oxygen measurement pressure 100 bar (1450 psi) at 60 °C (140 °F))	
Process connection	¼-18 NPT and flange connection with mounting thread M10 to DIN 19213 or 7/16-20 UNF to IEC 61518	
Material of mounting bracket		
• Steel	Sheet-steel, Mat. No. 1.0330, chrome-plated	
• Stainless steel	Sheet stainless steel, mat. no. 1.4301 (SS 304)	
Power supply U_H		
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	Supplied through bus -
Separate 24 V power supply necessary	-	No
Bus voltage		
• Not Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Basic current (max.)	-	12.5 mA
• Start-up current ≤ basic current	-	Yes
• Max. current in event of fault	-	15.5 mA
Fault disconnection electronics (FDE) available	-	Yes

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

SITRANS P, DS III for absolute pressure (from the differential pressure series)

	HART	PROFIBUS PA and FOUNDATION Fieldbus
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	
Explosion protection		
• Intrinsic safety "i"	PTB 13 ATEX 2007 X	
- Marking	Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +70 °C (-40 ... +158 °F) temperature class T5; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$; $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion-proof "d"	PTB 99 ATEX 1160	
- Marking	Ex II 1/2 G Ex d IIC T4/T6 Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$
• Dust explosion protection for zone 20	PTB 01 ATEX 2055	
- Marking	Ex II 1 D IP65 T 120 °C Ex II 1/2 D IP65 T 120 °C	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	
- Max. surface temperature	120 °C (248 °F)	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Dust explosion protection for zone 21/22	PTB 01 ATEX 2055	
- Marking	Ex II 2 D IP65 T 120 °C	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$; $P_{\max} = 1.2 \text{ W}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$; $P_{\max} = 1 \text{ W}$
• Type of protection "n" (zone 2)	PTB 13 ATEX 2007 X	
- Marking	Ex II 2/3 G Ex nA II T4/T5/T6 Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc	
- Connection (Ex nA)	$U_m = 45 \text{ V}$	$U_m = 32 \text{ V}$
- Connection (Ex ic)	To circuits with values: $U_i = 45 \text{ V}$	FISCO supply unit ic: $U_o = 17.5 \text{ V}$, $I_o = 570 \text{ mA}$ Linear barrier: $U_o = 32 \text{ V}$, $I_o = 132 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion protection acc. to FM	Certificate of Compliance 3008490	
- Identification (XP/DIP) or (IS); (NI)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	
• Explosion protection to CSA	Certificate of Compliance 1153651	
- Identification (XP/DIP) or (IS)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.08. r + 0.16) % / 28 °C (50 °F).

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

1

HART communication		FOUNDATION Fieldbus communication	
HART	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 to 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0, 1, or 2 (register operating mode and reset function for metering)	• PID	1 resource block
Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping, adjustable	0 ... 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input /Output		
- Failure mode	parameterizable (last good value, substitute value, incorrect value)		
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively		
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output		
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)		
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively		
• Physical block	1		
Transducer blocks	2		
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Square-rooted characteristic for flow measurement	Yes		
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

Selection and Ordering data		Article No.
Pressure transmitters for absolute pressure from differential pressure series, SITRANS P DS III with HART		7 MF 4 3 3 3 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	1
Inert liquid ¹⁾	grease-free to cleanliness level 2	3
Measuring span (min. ... max.)		
8.3 ... 250 mbar a	(0.12 ... 3.62 psia)	D
43 ... 1300 mbar a	(0.62 ... 18.85 psia)	F
0.16 ... 5 bar a	(2.32 ... 72.5 psia)	G
1 ... 30 bar a	(14.5 ... 435 psia)	H
5.3 ... 100 bar a	(76.9 ... 1450 psia)	KE
Wetted parts materials		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Tantalum	Tantalum	E
Monel	Monel	H
Gold	Gold	L
Version for diaphragm seal ^{2) 3) 4) 5) 6)}		Y
Process connection		
Female thread 1/4-18 NPT with flange connection		
<ul style="list-style-type: none"> Sealing screw opposite process connection <ul style="list-style-type: none"> Mounting thread 7/16-20 UNF to EN 61518 Mounting thread M10 to DIN 19213 (only for replacement requirement) Vent on side of process flange⁷⁾ <ul style="list-style-type: none"> Mounting thread 7/16-20 UNF to EN 61518 Mounting thread M10 to DIN 19213 (only for replacement requirement) 		2 0 6 4
Non-wetted parts materials		
process flange screws	Electronics housing	
Stainless steel	Die-cast aluminum	2
Stainless steel	Stainless steel precision casting ⁸⁾	3
Version		
<ul style="list-style-type: none"> Standard versions International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		1 2
Explosion protection		
<ul style="list-style-type: none"> None With ATEX, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety (Ex ia)" "Explosion-proof (Ex d)"⁹⁾ "Intrinsic safety and flameproof enclosure (Ex ia + Ex d)"¹⁰⁾ "Ex nA/ic (Zone 2)"¹¹⁾ "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)"¹⁰⁾¹²⁾ FM + CSA intrinsic safe (is) FM + CSA (is + ep) + Ex ia + Ex d (ATEX)¹²⁾ With FM + CSA, Type of protection: <ul style="list-style-type: none"> "Intrinsic Safe und Explosion Proof (is + xp)"⁹⁾ 		A B D P E R F S NC
Electrical connection/cable entry		
<ul style="list-style-type: none"> Screwed gland Pg 13.5¹³⁾ Screwed gland M20 x 1.5 Screwed gland 1/2-14 NPT Han 7D plug (plastic housing) incl. mating connector¹³⁾ M12 connectors (stainless steel)^{14) 15)} 		A B C D F

Selection and Ordering data		Article No.
Pressure transmitters for absolute pressure from differential pressure series, SITRANS P DS III with HART		7 MF 4 3 3 3 -
Display		
<ul style="list-style-type: none"> Without display Without visible display (display concealed, setting: mA) With visible display (setting: mA) with customer-specific display (setting as specified, Order code "Y21" or "Y22" required) 	0 1 6 7	
Power supply units see Chap. 7 "Supplementary Components".		
Included in delivery of the device:		
<ul style="list-style-type: none"> Brief instructions (Leporello) CD-ROM with detailed documentation Sealing plug(s) or sealing screw(s) for the process flanges(s) 		
<ol style="list-style-type: none"> For oxygen applications, add Order code E10. Version 7MF4333-1DY... only up to max. span 200 mbar a (2.9 psia). When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here. If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF433-...Y...-... und 7MF4900-1...-B The standard measuring cell filling for configurations with remote seals (Y) is silicone oil. Not for span "5.3 ... 100 bar a (76.9 ... 1450 psia)". Position of the top vent valve in the process flange (see dimensional drawing). Not in conjunction with Electrical connection "Screwed gland Pg 13.5" and "Han7D plug". Without cable gland, with blanking plug With enclosed cable gland Ex ia and blanking plug Configurations with HAN and M12 connectors are only available in Ex ic. Only in connection with IP65. Only in connection with Ex approval A, B or E. Only in connection with Ex approval A, B, E or F. M12 delivered without cable socket. 		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

1

Selection and Ordering data	Article No.	
Pressure transmitter for absolute pressure from differential pressure series		
SITRANS P DS III with PROFIBUS PA (PA)	7MF4334-	
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7MF4335-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling		
Silicone oil	1	
Inert liquid ¹⁾	3	
Measuring cell cleaning		
normal	D	
grease-free to cleanliness level 2	F G H KE	
Nominal measuring range		
250 mbar a (3.62 psia)	D	
1300 mbar a (18.85 psia)	F	
5 bar a (72.5 psia)	G	
30 bar a (435 psia)	H	
100 bar a (1450 psia)	KE	
Wetted parts materials		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Tantalum	Tantalum	E
Monel	Monel	H
Gold	Gold	L
Version as diaphragm seal	2) 3) 4) 5) 6)	Y
Process connection		
Female thread 1/4-18 NPT with flange connection		
• Sealing screw opposite process connection		
- Mounting thread 7/16-20 UNF to IEC 61518	2	
- Mounting thread M10 to DIN 19213 (only for replacement requirement)	0	
• Vent on side of process flange ⁷⁾		
- Mounting thread 7/16-20 UNF to IEC 61518	6	
- Mounting thread M10 to DIN 19213 (only for replacement requirement)	4	
Non-wetted parts materials		
process flange screws	Electronics housing	
Stainless steel	Die-cast aluminum	2
Stainless steel	Stainless steel precision casting	3
Version		
• Standard versions	1	
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	2	
Explosion protection		
• None	A	
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"	B	
- "Explosion-proof (Ex d)" ⁸⁾	D	
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)" ⁹⁾	P	
- "Ex nA/IC (Zone 2)" ¹⁰⁾	E	
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" ^{9) 11)} (not for DS III FF)	R	
• FM + CSA intrinsic safe (is)	F	
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ¹¹⁾	S	
• With FM + CSA, Type of protection:		
- "Intrinsic Safe und Explosion Proof (is + xp)" ⁸⁾	NC	
Electrical connection/cable entry		
• Screwed gland M20 x 1.5	B	
• Screwed gland 1/2-14 NPT	C	
• M12 connectors (stainless steel) ^{12) 13)}	F	

Selection and Ordering data	Article No.
Pressure transmitter for absolute pressure from differential pressure series	
SITRANS P DS III with PROFIBUS PA (PA)	7MF4334-
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7MF4335-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Display	
• Without display	0
• Without visible display (display concealed, setting: bar)	1
• With visible display (setting: bar)	6
• With customer-specific display (setting as specified, Order code "Y21" required)	7
Included in delivery of the device:	
• Brief instructions (Leporello)	
• CD-ROM with detailed documentation	
• Sealing plug(s) or sealing screw(s) for the process flanges(s)	
¹⁾ For oxygen application, add Order code E10. ²⁾ Version 7MF4334-1DY... only up to max. span 200 mbar a (80 inH ₂ O a). ³⁾ When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here. ⁴⁾ If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. ⁵⁾ The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF433-..Y.-.... und 7MF4900-1...-B ⁶⁾ The standard measuring cell filling for configurations with remote seals (Y) is silicone oil. ⁷⁾ Not for nominal measuring range 100 bar a (1450 psia). Position of the top vent valve in the process flange (see dimensional drawing). ⁸⁾ Without cable gland, with blanking plug ⁹⁾ With enclosed cable gland Ex ia and blanking plug ¹⁰⁾ Configurations with HAN and M12 connectors are only available in Ex ic. ¹¹⁾ Only in connection with IP65. ¹²⁾ Only in connection with Ex approval A, B, E or F. ¹³⁾ M12 delivered without cable socket	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:				
• Steel	A01	✓	✓	✓
• Stainless steel	A02	✓	✓	✓
O-rings for process flanges (instead of FPM (Viton))				
• PTFE (Teflon)	A20	✓	✓	✓
• FEP (with silicone core, approved for food)	A21	✓	✓	✓
• FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22	✓	✓	✓
• NBR (Buna N)	A23	✓	✓	✓
Plug				
• Han 7D (metal)	A30	✓		
• Han 8D (instead of Han 7D)	A31	✓		
• Angled	A32	✓		
• Han 8D (metal)	A33	✓		
Sealing screw ¼-18 NPT, with valve in mat. of process flanges	A40	✓	✓	✓
Cable sockets for M12 connectors (metal (CuZn))	A50	✓	✓	✓
Rating plate inscription (instead of German)				
• English	B11	✓	✓	✓
• French	B12	✓	✓	✓
• Spanish	B13	✓	✓	✓
• Italian	B14	✓	✓	✓
• Cyrillic (russian)	B16	✓	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	B21	✓	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2¹⁾	C11	✓	✓	✓
Inspection certificate²⁾ Acc. to EN 10204-3.1	C12	✓	✓	✓
Factory certificate Acc. to EN 10204-2.2	C14	✓	✓	✓
Functional safety (SIL2) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓		
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	C21 ³⁾		✓	
Functional safety (SIL2/3) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓		
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request)	C99	✓	✓	✓
Setting of upper limit of output signal to 22.0 mA	D05	✓		
Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009) (only together with seal diaphragm made of Hastelloy and stainless steel)	D07	✓	✓	✓
Degree of protection IP66/IP68 (only for M20 x 1.5 and ½-14 NPT)	D12	✓	✓	✓
Supplied with oval flange (1 item), PTFE packing and screws in thread of process flange	D37	✓	✓	✓
Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓	✓
Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Use in or on zone 1D/2D (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B..) Ex ia)" and IP65)	E01	✓	✓	✓
Oxygen application (In the case of oxygen measurement and inert liquid max. 100 bar (1450 psi) at 60°C (140 °F))	E10	✓	✓	✓
Export approval Korea	E11	✓	✓	✓
CRN approval Canada (Canadian Registration Number)	E22	✓	✓	✓
Dual seal	E24	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25 ⁴⁾	✓	✓	✓
"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26 ⁴⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28 ⁴⁾	✓	✓	
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45 ⁴⁾	✓	✓	✓
Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46 ⁴⁾	✓	✓	✓
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55 ⁴⁾	✓	✓	✓
Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56 ⁴⁾	✓	✓	✓
Explosion-proof "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57 ⁴⁾	✓	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58 ⁴⁾	✓	✓	✓
"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]..-Z + E11)	E70 ⁴⁾	✓	✓	✓
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓	✓
Interchanging of process connection side	H01	✓	✓	✓
Vent on side for gas measurements	H02	✓	✓	✓
Stainless steel process flanges for vertical differential pressure lines (not together with K01, K02 and K04) ⁵⁾	H03	✓	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓	✓
Chambered graphite gasket for process flange	J02	✓	✓	✓
Chambered PTFE graphite gasket	J03	✓	✓	✓
EPDM O-rings for process flange with approval (WRC/WRAS)	J05	✓	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)⁶⁾	J08	✓	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)⁶⁾	J09	✓	✓	✓

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

1

Selection and Ordering data	Order code			
Further designs Add "-Z" to Article No. and specify Order code.		HART	PA	FF
Process flange				
• Hastelloy	K01	✓	✓	✓
• Monel	K02	✓	✓	✓
• Stainless steel with PVDF insert max. PN 10 (MAWP 145 psi), max. temperature of medium 90 °C (194 °F) For ½-14 NPT inner process connection on the side in the middle of the process flange, vent valve not possible	K04	✓	✓	✓
1) When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.				
2) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.				
3) Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H				
4) Option does not include ATEX approval, but instead includes only the country-specific approval.				
5) Not suitable for connection of remote seals.				
6) Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.				
Selection and Ordering data	Order code			
Additional data		HART	PA	FF
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set	Y01	✓	✓ ¹⁾	
Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi				
Stainless steel tag plate and entry in device variable (measuring point description)	Y15	✓	✓	✓
Max. 16 characters, specify in plain text: Y15:				
Measuring point text (entry in device variable)	Y16	✓	✓	✓
Max. 27 characters, specify in plain text: Y16:				
Entry of HART address (TAG)	Y17	✓		
Max. 8 characters, specify in plain text: Y17:				
Setting of pressure indication in pressure units	Y21	✓	✓	✓
Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O [*] , inH ₂ O [*] , ftH ₂ O [*] , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % *) ref. temperature 20 °C				
Setting of pressure indication in non-pressure units²⁾	Y22 + Y01	✓		
Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)				
Preset bus address	Y25		✓	✓
possible between 1 and 126 Specify in plain text: Y25:				
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓

Factory mounting of valve manifolds, see accessories.

Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset

✓ = available

1) Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

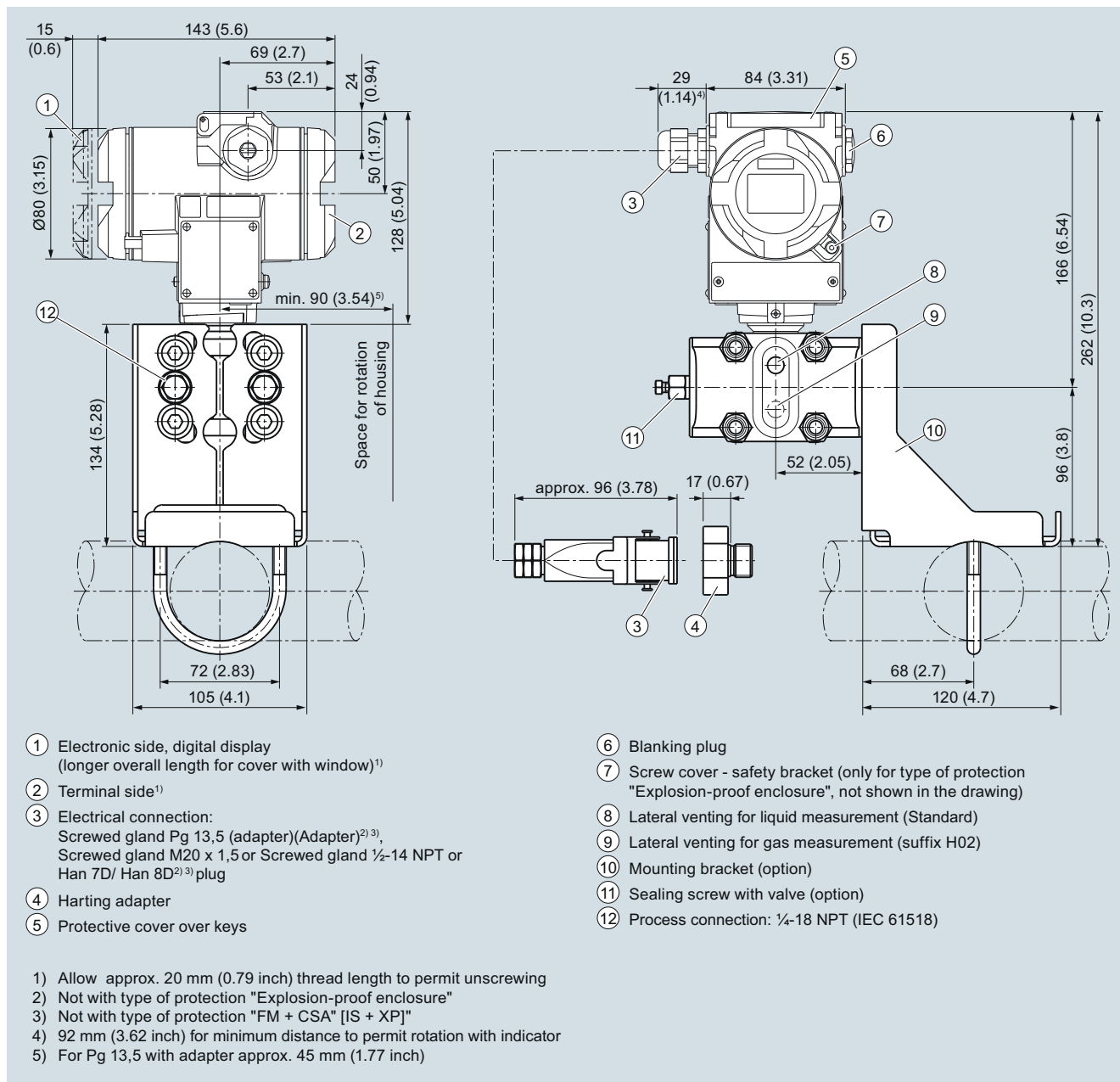
2) Preset values can only be changed over SIMATIC PDM.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for absolute pressure (from differential pressure series)

Dimensional drawings



SITRANS P DS III pressure transmitters for absolute pressure, from the differential pressure series, dimensions in mm (inch)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

Technical specifications

SITRANS P, DS III for differential pressure and flow				
	HART	PROFIBUS PA and FOUNDATION Fieldbus		
Input	Differential pressure and flow			
Measured variable	Differential pressure and flow			
Spans (infinitely adjustable) or nominal measuring range and max. permissible operating pressure	Span (min. ... max.)	Maximum operating pressure	Nominal measuring range	Maximum operating pressure
	1 ... 20 mbar (0.4 ... 8 inH ₂ O)	32 bar (464 psi)	20 mbar (8 inH ₂ O)	32 bar (464 psi)
	1 ... 60 mbar (0.4 ... 24 inH ₂ O) 2.5 ... 250 mbar (1 ... 100 inH ₂ O) 6 ... 600 mbar (2.4 ... 240 inH ₂ O) 16 ... 1600 mbar (6.4 ... 642 inH ₂ O) 50 ... 5000 mbar (20 ... 2000 inH ₂ O)	160 bar (2320 psi)	60 mbar (24 inH ₂ O) 250 mbar (100 inH ₂ O) 600 mbar (240 inH ₂ O) 1600 mbar (642 inH ₂ O) 5 bar (2000 inH ₂ O)	160 bar (2320 psi)
	0.3 ... 30 bar (4.35 ... 435 psi)	420 bar (6091 psi)	250 mbar (100 inH ₂ O) 600 mbar (240 inH ₂ O) 1600 mbar (642 inH ₂ O) 5 bar (2000 inH ₂ O) 30 bar (435 psi)	420 bar (6091 psi)
Lower measuring limit	-100 % of max. span or 30 mbar a (0.44 psia) (-33 % with 30 bar (435 psi) measuring cell)			
• Measuring cell with silicone oil filling				
Upper measuring limit	100 % of max. span (for oxygen version and inert filling liquid; max. 120 bar (1740 psi))			
Output				
Output signal	4 ... 20 mA	Digital PROFIBUS PA and FOUNDATION Fieldbus signal		
• Lower limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA	-		
• Upper limit (infinitely adjustable)	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA	-		
Load				
• Without HART	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in Ω , U_H : Power supply in V	-		
• With HART	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)	-		
Physical bus	-	IEC 61158-2		
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy	Acc. to IEC 60770-1			
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)			
	Span ratio $r = \text{max. span/set span}$	Nominal measuring range ratio $r = \text{nominal measuring range/set measuring range}$		
Error in measurement at limit setting incl. hysteresis and reproducibility				
• Linear characteristic				
- $r \leq 10$	$\leq (0.0029 \cdot r + 0.071) \%$	$\leq (0.0029 \cdot r + 0.071) \%$		
- $10 < r \leq 30$	$\leq (0.0045 \cdot r + 0.071) \%$	$\leq (0.0045 \cdot r + 0.071) \%$		
- $30 < r \leq 100$	$\leq (0.005 \cdot r + 0.05) \%$	$\leq (0.005 \cdot r + 0.05) \%$		
• Square-rooted characteristic (flow > 50 %)				
- $r \leq 10$	$\leq 0.1 \%$	$\leq 0.1 \%$		
- $10 < r \leq 30$	$\leq 0.2 \%$	$\leq 0.2 \%$		
• Square-rooted characteristic (flow > 25 ... 50 %)				
- $r \leq 10$	$\leq 0.2 \%$	$\leq 0.2 \%$		
- $10 < r \leq 30$	$\leq 0.4 \%$	$\leq 0.4 \%$		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

SITRANS P, DS III for differential pressure and flow		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Long-term stability (temperature change $\pm 30\text{ °C}$ ($\pm 54\text{ °F}$))		
<ul style="list-style-type: none"> • 250, 600, 1600 and 5000 mbar (0.29, 0.87, 2.32 and 7.25 psi)-measuring cell 	$\leq (0.125 \cdot r)$ per 5 years	$\leq (0.125 \cdot r)$ per 5 years
<ul style="list-style-type: none"> • 20 mbar (8 inH₂O)-measuring cell 	$\leq (0.2 \cdot r)$ per year	$\leq (0.2 \cdot r)$ per year
<ul style="list-style-type: none"> • 60 mbar (24 inH₂O)-measuring cell 	$\leq (0.25 \cdot r)$ % per 5 years	$\leq (0.25 \cdot r)$ % per 5 years
<ul style="list-style-type: none"> • 30 bar (435 psi)-measuring cell 	$\leq (0.25 \cdot r)$ % per 5 years	$\leq (0.25 \cdot r)$ % per 5 years
Influence of ambient temperature (Twice the value with 20 mbar (8 inH ₂ O)-measuring cell)		
<ul style="list-style-type: none"> • at $-10 \dots +60\text{ °C}$ ($14 \dots 140\text{ °F}$) 	$\leq (0.08 \cdot r + 0.1)\text{ ‰}^1$	$\leq (0.08 \cdot r + 0.1)\text{ ‰}^1$
<ul style="list-style-type: none"> • at $-40 \dots -10\text{ °C}$ and $60 \dots 85\text{ °C}$ ($-40 \dots +14\text{ °F}$ and $140 \dots 185\text{ °F}$) 	$\leq (0.1 \cdot r + 0.15)\text{ ‰}/10\text{ K}$	$\leq (0.1 \cdot r + 0.15)\text{ ‰}/10\text{ K}$
Influence of static pressure		
<ul style="list-style-type: none"> • on the zero point (PKN) <ul style="list-style-type: none"> - 20 mbar (0.29 psi)-measuring cell 	$\leq (0.15 \cdot r)$ % per 70 bar (1015 psi) $\leq (0.15 \cdot r)$ % per 32 bar (464 psi)	$\leq (0.15 \cdot r)$ % per 70 bar (1015 psi) $\leq (0.15 \cdot r)$ % per 32 bar (464 psi)
<ul style="list-style-type: none"> • on the span (PKS) <ul style="list-style-type: none"> - 20 mbar (0.29 psi)-measuring cell 	$\leq 0.14\text{ ‰}$ per 70 bar (1015 psi) $\leq 0.2\text{ ‰}$ per 32 bar (464 psi)	$\leq 0.14\text{ ‰}$ per 70 bar (1015 psi) $\leq 0.2\text{ ‰}$ per 32 bar (464 psi)
Measured Value Resolution	-	$3 \cdot 10^{-5}$ of nominal measuring range
Rated conditions		
Degree of protection (to EN 60529)	IP66 (optional IP66/IP68), NEMA 4X	
Temperature of medium		
<ul style="list-style-type: none"> • Measuring cell with silicone oil filling 	$-40 \dots +100\text{ °C}$ ($-40 \dots +212\text{ °F}$)	
<ul style="list-style-type: none"> • Measuring cell with inert filling liquid 	$-20 \dots +100\text{ °C}$ ($-4 \dots +212\text{ °F}$) with 30 bar measuring cell	
<ul style="list-style-type: none"> • In conjunction with dust explosion protection 	$-20 \dots +60\text{ °C}$ ($-4 \dots +140\text{ °F}$)	
Ambient conditions		
<ul style="list-style-type: none"> • Ambient temperature <ul style="list-style-type: none"> - Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics) 	$-40 \dots +85\text{ °C}$ ($-40 \dots +185\text{ °F}$)	
<ul style="list-style-type: none"> - Display readable 	$-30 \dots +85\text{ °C}$ ($-22 \dots +185\text{ °F}$)	
<ul style="list-style-type: none"> • Storage temperature 	$-50 \dots +85\text{ °C}$ ($-58 \dots +185\text{ °F}$)	
<ul style="list-style-type: none"> • Climatic class <ul style="list-style-type: none"> - Condensation 	Relative humidity $0 \dots 100\text{ ‰}$ Condensation permissible, suitable for use in the tropics	
<ul style="list-style-type: none"> • Electromagnetic Compatibility <ul style="list-style-type: none"> - Emitted interference and interference immunity 	Acc. to IEC 61326 and NAMUR NE 21	
Design		
Weight (without options)	Die-cast aluminum: $\approx 4.5\text{ kg}$ ($\approx 9.9\text{ lb}$) Stainless steel precision casting: $\approx 7.1\text{ kg}$ ($\approx 15.6\text{ lb}$)	
Enclosure material	Low-copper die-cast aluminum, GD-ALSi12 or stainless steel precision casting, mat. no. 1.4408	
Wetted parts materials		
<ul style="list-style-type: none"> • Seal diaphragm 	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819, Monel, mat. no. 2.4360, tantalum or gold	
Measuring cell filling	Silicone oil or inert filling liquid (maximum value with oxygen measurement pressure 100 bar (1450 psi) at 60 °C (140 °F))	
Process connection	Female thread $1/4\text{-}18\text{ NPT}$ and flange connection with mounting thread M10 to DIN 19213 or $1/16\text{-}20\text{ UNF}$ to IEC 61518	
Material of mounting bracket		
<ul style="list-style-type: none"> • Steel 	Sheet-steel, Mat. No. 1.0330, chrome-plated	
<ul style="list-style-type: none"> • Stainless steel 	Sheet stainless steel, mat. no. 1.4301 (SS 304)	

SITRANS P, DS III for differential pressure and flow		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Power supply U_H		
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	Supplied through bus -
Separate 24 V power supply necessary	-	No
Bus voltage		
• Not Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Basic current (max.)	-	12.5 mA
• Start-up current \leq basic current	-	Yes
• Max. current in event of fault	-	15.5 mA
Fault disconnection electronics (FDE) available	-	Yes
Certificates and approvals		
Classification according to PED 97/23/EC PN 32/160 (MAWP 464/2320 psi)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	
PN 420 (MAWP 6092 psi)	For gases of fluid group 1 and liquids of fluid group 1; complies with basic safety requirements of Article 3, paragraph 1 (appendix 1); assigned to category III, conformity evaluation module H by the TÜV Nord.	
Explosion protection		
• Intrinsic safety "i"	PTB 13 ATEX 2007 X	
- Marking	Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +70 °C (-40 ... +158 °F) temperature class T5; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$; $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion-proof "d"	PTB 99 ATEX 1160	
- Marking	Ex II 1/2 G Ex d IIC T4/T6 Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$
• Dust explosion protection for zone 20	PTB 01 ATEX 2055	
- Marking	Ex II 1 D IP65 T 120 °C Ex II 1/2 D IP65 T 120 °C	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	
- Max. surface temperature	120 °C (248 °F)	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Dust explosion protection for zone 21/22	PTB 01 ATEX 2055	
- Marking	Ex II 2 D IP65 T 120 °C	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$; $P_{\text{max}} = 1.2 \text{ W}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$; $P_{\text{max}} = 1 \text{ W}$

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

SITRANS P, DS III for differential pressure and flow		HART	PROFIBUS PA and FOUNDATION Fieldbus
• Type of protection "n" (zone 2)			PTB 13 ATEX 2007 X
- Marking			Ex II 2/3 G Ex nA IIC T4/T5/T6 Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc
- Connection (Ex nA)	$U_m = 45 \text{ V}$		$U_m = 32 \text{ V}$
- Connection (Ex ic)	To circuits with values: $U_i = 45 \text{ V}$		FISCO supply unit ic: $U_o = 17.5 \text{ V}, I_o = 570 \text{ mA}$ Linear barrier: $U_o = 32 \text{ V}, I_o = 132 \text{ mA}, P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}, C_i = 6 \text{ nF}$		$L_i = 7 \text{ } \mu\text{H}, C_i = 1.1 \text{ nF}$
• Explosion protection acc. to FM			Certificate of Compliance 3008490
- Identification (XP/DIP) or (IS); (NI)		CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	
• Explosion protection to CSA			Certificate of Compliance 1153651
- Identification (XP/DIP) or (IS)		CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	

¹⁾ Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.064 · r + 0.08) % / 28 °C (50 °F).

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

HART communication		FOUNDATION Fieldbus communication	
HART Protocol	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Software for PC	HART Version 5.x SIMATIC PDM	<ul style="list-style-type: none"> Analog input <ul style="list-style-type: none"> - Adaptation to customer-specific process variables - Electrical damping, adjustable - Simulation function Failure mode Limit monitoring Square-rooted characteristic for flow measurement 	Yes, linearly rising or falling characteristic 0 ... 100 s Output/input (can be locked within the device with a bridge) parameterizable (last good value, substitute value, incorrect value) Yes, one upper and lower warning limit and one alarm limit respectively Yes
PROFIBUS PA communication		<ul style="list-style-type: none"> PID Physical block 	Standard FOUNDATION Fieldbus function block 1 resource block
Simultaneous communication with master class 2 (max.)	4	Transducer blocks	1 transducer block Pressure with calibration, 1 transducer block LCD
The address can be set using	Configuration tool or local operation (standard setting address 126)	<ul style="list-style-type: none"> Pressure transducer block <ul style="list-style-type: none"> - Can be calibrated by applying two pressures - Monitoring of sensor limits - Simulation function: Measured pressure value, sensor temperature and electronics temperature 	Yes Yes Constant value or over parameterizable ramp function
Cyclic data usage			
<ul style="list-style-type: none"> Output byte 	5 (one measured value) or 10 (two measured values)		
<ul style="list-style-type: none"> Input byte 	0, 1, or 2 (register operating mode and reset function for metering)		
Internal preprocessing			
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B		
Function blocks	2		
<ul style="list-style-type: none"> Analog input <ul style="list-style-type: none"> - Adaptation to customer-specific process variables - Electrical damping, adjustable - Simulation function - Failure mode - Limit monitoring Register (totalizer) <ul style="list-style-type: none"> - Failure mode - Limit monitoring Physical block 	Yes, linearly rising or falling characteristic 0 ... 100 s Input /Output parameterizable (last good value, substitute value, incorrect value) Yes, one upper and lower warning limit and one alarm limit respectively Can be reset, preset, optional direction of counting, simulation function of register output parameterizable (summation with last good value, continuous summation, summation with incorrect value) One upper and lower warning limit and one alarm limit respectively		
Transducer blocks	1		
<ul style="list-style-type: none"> Pressure transducer block <ul style="list-style-type: none"> - Can be calibrated by applying two pressures - Monitoring of sensor limits - Specification of a container characteristic with - Square-rooted characteristic for flow measurement - Gradual volume suppression and implementation point of square-root extraction - Simulation function for measured pressure value and sensor temperature 	2 Yes Yes Max. 30 nodes Yes Parameterizable Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

Selection and Ordering data		Article No.
SITRANS P DS III with HART pressure transmitters for differential pressure and flow, PN 32/160 (MAWP 464/2320 psi)		7 MF 4 4 3 3 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	▶ ◆ 1
Inert liquid ¹⁾	grease-free to cleanliness level 2	▶ ◆ 3
Measuring span (min. ... max.)		
PN 32 (MAWP 464 psi)		
1 ... 20 mbar ²⁾	(0.4015 ... 8.03 inH ₂ O)	▶ ◆ B
PN 160 (MAWP 2320 psi)		
1 ... 60 mbar	(0.4015 ... 24.09 inH ₂ O)	▶ ◆ C
2.5 ... 250 mbar	(1.004 ... 100.4 inH ₂ O)	▶ ◆ D
6 ... 600 mbar	(2.409 ... 240.9 inH ₂ O)	▶ ◆ E
16 ... 1600 mbar	(6.424 ... 642.4 inH ₂ O)	▶ ◆ F
50 ... 5000 mbar	(20.08 ... 2008 inH ₂ O)	▶ ◆ G
0.3 ... 30 bar	(4.35 ... 435 psi)	▶ ◆ H
Wetted parts materials		
(stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	▶ ◆ A
Hastelloy	Stainless steel	▶ ◆ B
Hastelloy	Hastelloy	▶ ◆ C
Tantalum ³⁾	Tantalum	▶ ◆ E
Monel ³⁾	Monel	▶ ◆ H
Gold ³⁾	Gold	▶ ◆ L
Version for diaphragm seal ^{4) 5) 6) 7)}		▶ ◆ Y
Process connection		
Female thread 1/4-18 NPT with flange connection		
• Sealing screw opposite process connection		
- Mounting thread 7/16-20 UNF to IEC 61518	▶ ◆	2
- Mounting thread M10 to DIN 19213 (only for replacement requirement)	◆	0
• Vent on side of process flange ²⁾		
- Mounting thread 7/16-20 UNF to IEC 61518	▶ ◆	6
- Mounting thread M10 to DIN 19213 (only for replacement requirement)	▶ ◆	4
Non-wetted parts materials		
process flange screws Electronics housing		
Stainless steel	Die-cast aluminum	▶ ◆ 2
Stainless steel	Stainless steel precision casting ⁸⁾	▶ ◆ 3
Version		
• Standard versions	◆	1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	▶ ◆	2
Explosion protection		
• None	◆	A
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"	◆	B
- "Explosion-proof (Ex d) ⁹⁾	◆	D
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) ¹⁰⁾	◆	P
- "Ex nA/ic (Zone 2) ¹¹⁾	◆	E
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D) ¹⁰⁾¹²⁾	▶ ◆	R
• FM + CSA intrinsic safe (is)	◆	F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ¹²⁾	◆	S
• With FM + CSA, Type of protection:		
- "Intrinsic Safe und Explosion Proof (is + xp) ⁹⁾	◆	NC

Selection and Ordering data		Article No.
SITRANS P DS III with HART pressure transmitters for differential pressure and flow, PN 32/160 (MAWP 464/2320 psi)		7 MF 4 4 3 3 -
Electrical connection/cable entry		
• Screwed gland Pg 13.5 ¹³⁾	▶ ◆	A
• Screwed gland M20 x 1.5	▶ ◆	B
• Screwed gland 1/2-14 NPT	◆	C
• Han 7D plug (plastic housing) incl. mating connector ¹³⁾¹⁴⁾	◆	D
• M12 connectors (stainless steel) ¹⁵⁾¹⁶⁾	◆	F
Display		
• Without display	◆	0
• Without visible display (display concealed, setting: mA)	▶ ◆	1
• With visible display (setting: mA)	◆	6
• with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)	◆	7
▶ Available ex stock		
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.		
Power supply units see Chap. 7 "Supplementary Components".		
Included in delivery of the device:		
• Brief instructions (Leporello)		
• CD-ROM with detailed documentation		
• Sealing plug(s) or sealing screw(s) for the process flanges(s)		
1) For oxygen application, add Order code E10.		
2) Not suitable for connection of remote seal. Position of the top vent valve in the process flange (see dimensional drawing).		
3) Not in conjunction with max. span 20 and 60 mbar (8.03 und 24.09 inH ₂ O)		
4) When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here.		
5) If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.		
6) The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF443-...Y...-... und 7MF4900-1...-B		
7) The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.		
8) Not in conjunction with Electrical connection "Screwed gland Pg 13.5" and "Han7D plug".		
9) Without cable gland, with blanking plug		
10) With enclosed cable gland Ex ia and blanking plug		
11) Configurations with HAN and M12 connectors are only available in Ex ic.		
12) Only in connection with IP65.		
13) Only in connection with Ex approval A, B or E.		
14) Permissible only for crimp-contact of conductor cross-section 1 mm ²		
15) Only in connection with Ex approval A, B, E or F.		
16) M12 delivered without cable socket.		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

Selection and Ordering data		Article No.	Selection and Ordering data		Article No.
Pressure transmitters for differential pressure and flow PN 32/160 (MAWP 464/2320 psi)			Pressure transmitters for differential pressure and flow PN 32/160 (MAWP 464/2320 psi)		
SITRANS P DS III with PROFIBUS PA (PA)		7MF4434-	SITRANS P DS III with PROFIBUS PA (PA)		7MF4434-
SITRANS P DS III with FOUNDATION Fieldbus (FF)		7MF4435-	SITRANS P DS III with FOUNDATION Fieldbus (FF)		7MF4435-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Measuring cell filling	Measuring cell cleaning		Electrical connection/cable entry		
Silicone oil	normal	1	<ul style="list-style-type: none"> Screwed gland M20 x 1.5 Screwed gland ½-14 NPT M12 connectors (stainless steel)^{12) 13)} 		B C F
Inert liquid ¹⁾	grease-free to cleanliness level 2	3	Display		
Nominal measuring range			<ul style="list-style-type: none"> Without display Without visible display (display concealed, setting: bar) With visible display (setting: bar) With customer-specific display (setting as specified, Order code "Y21" required) 		0 1 6 7
PN 32 (MAWP 464 psi)	(8.03 inH ₂ O)	B	Included in delivery of the device:		
PN 160 (MAWP 2320 psi)			<ul style="list-style-type: none"> Brief instructions (Leporello) CD-ROM with detailed documentation Sealing plug(s) or sealing screw(s) for the process flanges(s) 		
60 mbar	(24.09 inH ₂ O)	C	<ol style="list-style-type: none"> For oxygen application, add Order code E10. Not suitable for connection of remote seal. Position of the top vent valve in the process flange (see dimensional drawing). Not in conjunction with max. span 20 and 60 mbar (8.03 und 24.09 inH₂O)) When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here. If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF443-..Y.-..... and 7MF4900-1...-B The standard measuring cell filling for configurations with remote seals (Y) is silicone oil. Without cable gland, with blanking plug. With enclosed cable gland Ex ia and blanking plug. Configurations with HAN and M12 connectors are only available in Ex ic. Only in connection with IP65. Only in connection with Ex approval A, B, E or F. M12 delivered without cable socket 		
250 mbar	(100.4 inH ₂ O)	D			
600 mbar	(240.9 inH ₂ O)	E			
1600 mbar	(642.4 inH ₂ O)	F			
5 bar	(2008 inH ₂ O)	G			
30 bar	(435 psi)	H			
Wetted parts materials					
(stainless steel process flanges)					
Seal diaphragm	Parts of measuring cell				
Stainless steel	Stainless steel	A			
Hastelloy	Stainless steel	B			
Hastelloy	Hastelloy	C			
Tantalum ³⁾	Tantalum	E			
Monel ³⁾	Monel	H			
Gold ³⁾	Gold	L			
Version as diaphragm seal ^{4) 5) 6) 7)}		Y			
Process connection					
Female thread ¼-18 NPT with flange connection					
<ul style="list-style-type: none"> Sealing screw opposite process connection Mounting thread 7/16"-20 UNF to IEC 61518 Mounting thread M10 to DIN 19213 (only for replacement requirement) 		2			
<ul style="list-style-type: none"> Venting on side of process flanges²⁾ Mounting thread 7/16"-20 UNF to IEC 61518 Mounting thread M10 to DIN 19213 (only for replacement requirement) 		0			
		6			
		4			
Non-wetted parts materials					
process flange screws	Electronics housing				
Stainless steel	Die-cast aluminum	2			
Stainless steel	Stainless steel precision casting	3			
Version					
<ul style="list-style-type: none"> Standard versions International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		1			
		2			
Explosion protection					
<ul style="list-style-type: none"> None With ATEX, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety (Ex ia)" "Explosion-proof (Ex d)⁸⁾ "Intrinsic safety and flameproof enclosure (Ex ia + Ex d)⁹⁾ "Ex nA/ic (Zone 2)"¹⁰⁾ "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)^{9) 11)}(not for DS III FF) FM + CSA intrinsic safe (is) FM + CSA (is + ep) + Ex ia + Ex d (ATEX)¹¹⁾ With FM + CSA, Type of protection: <ul style="list-style-type: none"> "Intrinsic Safe und Explosion Proof (is + xp)⁸⁾ 		A			
		B			
		D			
		P			
		E			
		R			
		F			
		S			
		NC			

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

Selection and Ordering data	Order code			Selection and Ordering data	Order code		
	HART	PA	FF		HART	PA	FF
Further designs Add "-Z" to Article No. and specify Order code.				Further designs Add "-Z" to Article No. and specify Order code.			
Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:				Setting of upper limit of output signal to 22.0 mA	D05	✓	
• Steel	• A01	✓	✓	✓			
• Stainless steel	• A02	✓	✓	✓			
O-rings for process flanges (instead of FPM (Viton))				Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009) (only together with seal diaphragm made of Hastelloy and stainless steel)	D07	✓	✓
• PTFE (Teflon)	• A20	✓	✓	✓			
• FEP (with silicone core, approved for food)	• A21	✓	✓	✓			
• FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	• A22	✓	✓	✓			
• NBR (Buna N)	• A23	✓	✓	✓			
plug				Degree of protection IP66/IP68 (only for M20 x 1.5 and ½-14 NPT)	D12	✓	✓
• Han 7D (metal)	• A30	✓					
• Han 8D (instead of Han 7D)	• A31	✓					
• Angled	• A32	✓					
• Han 8D (metal)	• A33	✓					
Sealing screws (2 units) ¼-18 NPT, with valve in mat. of process flanges	• A40	✓	✓	✓			
Cable sockets for M12 connectors (metal (CuZn))	• A50	✓	✓	✓			
Rating plate inscription (instead of German)				Process flange screws made of Monel (max. nominal pressure PN20)	D34	✓	✓
• English	• B11	✓	✓	✓			
• French	• B12	✓	✓	✓			
• Spanish	• B13	✓	✓	✓			
• Italian	• B14	✓	✓	✓			
• Cyrillic (russian)	• B16	✓	✓	✓			
English rating plate Pressure units in inH ₂ O and/or psi	• B21	✓	✓	✓			
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2¹⁾	• C11	✓	✓	✓			
Inspection certificate²⁾ to EN 10204-3.1	• C12	✓	✓	✓			
Factory certificate to EN 10204-2.2	• C14	✓	✓	✓			
Functional safety (SIL2) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	• C20	✓					
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	• C21 ³⁾		✓				
Functional safety (SIL2/3) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	• C23	✓					
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request)	• C99	✓	✓	✓			
				Supplied with oval flange set (2 items), PTFE packings and screws in thread of process flanges	D37	✓	✓
				Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓
				Use in or on zone 1D/2D (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B.. Ex ia)" and IP65)	E01	✓	✓
				Overfilling safety device for flammable and non-flammable liquids (max. PN 32 (MAWP 464 psi), basic device with type of protection "Intrinsic safety (Ex ia)", to WHG and VbF, not together with measuring cell filling "inert liquid")	E08	✓	
				Oxygen application (In the case of oxygen measurement and inert liquid max. 100 bar (1450 psi) at 60°C (140 °F))	E10	✓	✓
				Export approval Korea	E11	✓	✓
				CRN approval Canada (Canadian Registration Number)	E22	✓	✓
				Dual seal	E24	✓	✓
				Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25 ⁴⁾	✓	✓
				"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26 ⁴⁾	✓	✓
				Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28 ⁴⁾	✓	✓
				Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45 ⁴⁾	✓	✓
				Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46 ⁴⁾	✓	✓
				Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55 ⁴⁾	✓	✓
				Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56 ⁴⁾	✓	✓
				Explosion-proof "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57 ⁴⁾	✓	✓
				Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58 ⁴⁾	✓	✓
				"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]..-Z + E11)	E70 ⁴⁾	✓	✓

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

Selection and Ordering data	Order code	HART	PA	FF
Further designs Add "-Z" to Article No. and specify Order code.				
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓	✓
Interchanging of process connection side	H01	✓	✓	✓
Vent on side for gas measurements	H02	✓	✓	✓
Stainless steel process flanges for vertical differential pressure lines (not together with K01, K02 and K04) ⁵⁾	H03	✓	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓	✓
Chambered graphite gasket for process flange	J02	✓	✓	✓
Chambered PTFE graphite gasket	J03	✓	✓	✓
EPDM O-rings for process flange with approval (WRC/WRAS)	J05	✓	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)⁶⁾	J08	✓	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)⁶⁾	J09	✓	✓	✓
Process flange				
• Hastelloy	K01	✓	✓	✓
• Monel	K02	✓	✓	✓
• Stainless steel with PVDF insert max. PN 10 (MAWP 145 psi), max. temperature of medium 90 °C (194 °F) For ½-14 NPT inner process connection on the side in the middle of the process flange, vent valve not possible	K04	✓	✓	✓
<p>◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.</p> <p>Factory mounting of valve manifolds, see accessories.</p> <p>Supplementary electronics for 4-wire connection, see accessories.</p> <p>✓ = available</p>				

- 1) When the manufacture's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.
- 2) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.
- 3) Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H
- 4) Option does not include ATEX approval, but instead includes only the country-specific approval.
- 5) Not suitable for connection of remote seal.
- 6) Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.

Selection and Ordering data	Order code	HART	PA	FF
Additional data Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text:				
• in the case of linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	◆ Y01	✓	✓ ¹⁾	
• in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	◆ Y02	✓		
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	◆ Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 char., specify in plain text: Y16:	◆ Y16	✓	✓	✓
Entry of HART address (TAG) Max. 8 char., specify in plain text: Y17:	◆ Y17	✓		
Setting of pressure indicator in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O [*] , inH ₂ O [*] , ftH ₂ O [*] , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % *) ref. temperature 20 °C	◆ Y21	✓	✓	✓
Setting of pressure indicator in non-pressure units²⁾ Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" or "Y02" is essential, unit with max. 5 characters)	◆ Y22 ³⁾ + Y01 or Y02	✓		
Preset bus address possible between 1 and 126 Specify in plain text: Y25:	Y25		✓	✓
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓
<p>◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.</p> <p>Factory mounting of valve manifolds, see accessories.</p> <p>Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 und D05 can be factory preset</p> <p>✓ = available</p>				

- 1) Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.
- 2) Preset values can only be changed over SIMATIC PDM.
- 3) Not in conjunction with over-filling safety device for flammable and non-flammable liquids (Order code "E08")

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

Selection and Ordering data		Article No.
SITRANS P DS III with HART pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)		7MF4533-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	1
Measuring span (min. ... max.)		
2.5 ... 250 mbar	(1.004 ... 100.4 inH ₂ O)	D
6 ... 600 mbar	(2.409 ... 240.9 inH ₂ O)	E
16 ... 1600 mbar	(6.424 ... 642.4 inH ₂ O)	F
50 ... 5000 mbar	(20.08 ... 2008 inH ₂ O)	G
0.3 ... 30 bar	(4.35 ... 435 psi)	H
Wetted parts materials (stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Gold ¹⁾	Gold	L
Ausführung als Membrandruckmittler ^{2) 3) 4) 5)}		Y
Process connection		
Female thread 1/4-18 NPT with flange connection		
<ul style="list-style-type: none"> Sealing screw opposite process connection <ul style="list-style-type: none"> Mounting thread 7/16"-20 UNF to IEC 61518 Mounting thread M12 to DIN 19213 (only for replacement requirement) Venting on side of process flanges, location of vent valve at top of process flanges (see dimensional drawing) <ul style="list-style-type: none"> Mounting thread 7/16"-20 UNF to IEC 61518 Mounting thread M12 to DIN 19213 (only for replacement requirement) 		3 1 7 5
Non-wetted parts materials		
process flange screws	Electronics housing	
Stainless steel	Die-cast aluminum	2
Stainless steel	Stainless steel precision casting ⁶⁾	3
Version		
<ul style="list-style-type: none"> Standard versions International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		1 2
Explosion protection		
<ul style="list-style-type: none"> None With ATEX, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety (Ex ia)" "Explosion-proof (Ex d)⁷⁾" "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)⁸⁾ "Ex nA/ic (Zone 2)⁹⁾" "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)⁸⁾¹⁰⁾" FM + CSA intrinsic safe (is) FM + CSA (is + ep) + Ex ia + Ex d (ATEX)¹⁰⁾ With FM + CSA, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety and explosion-proof (is + xp)⁷⁾, max PN 360 		A B D P E R F S NC
Electrical connection/cable entry		
<ul style="list-style-type: none"> Screwed gland Pg 13.5¹¹⁾ Screwed gland M20x1.5 Screwed gland 1/2-14 NPT Han 7D plug (plastic housing) incl. mating connector¹¹⁾¹²⁾ M12 connectors (stainless steel)^{13) 14)} 		A B C D F

Selection and Ordering data		Article No.
SITRANS P DS III with HART pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)		7MF4533-
Display		
<ul style="list-style-type: none"> Without display Without visible display (display concealed, setting: mA) With visible display (setting: mA) with customer-specific display (setting as specified, Order code "Y21" or "Y22" required) 	0 1 6 7	
Power supply units see Chap. 7 "Supplementary Components".		
Scope of delivery: Pressure transmitter as ordered (Instruction Manual is extra ordering item)		
<ol style="list-style-type: none"> Not in conjunction with max. span 600 mbar (240.9 inH₂O) When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here. If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals. The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF453-...Y...-... und 7MF4900-1...-B The standard measuring cell filling for configurations with remote seals (Y) is silicone oil. Not in conjunction with Electrical connection "Screwed gland Pg 13.5" and "Han7D plug". Without cable gland, with blanking plug With enclosed cable gland Ex ia and blanking plug Configurations with HAN and M12 connectors are only available in Ex ic. Only in connection with IP65. Only in connection with Ex approval A, B or E. Permissible only for crimp-contact of conductor cross-section 1 mm² Only in connection with Ex approval A, B, E or F. M12 delivered without cable socket. 		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

1

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)		Pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)	
SITRANS P DS III with PROFIBUS PA (PA)	7 MF 4 5 3 4 -	SITRANS P DS III with PROFIBUS PA (PA)	7 MF 4 5 3 4 -
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 MF 4 5 3 5 -	SITRANS P DS III with FOUNDATION Fieldbus (FF)	7 MF 4 5 3 5 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	1 ■■■■ - ■■■■		1 ■■■■ - ■■■■
Nominal measuring range		Display	
250 mbar (100.4 inH ₂ O)	D	• Without (display hidden)	0
600 mbar (240.9 inH ₂ O)	E	• Without visible display (display concealed, setting: bar)	1
1600 mbar (642.4 inH ₂ O)	F	• With visible display (setting: bar)	6
5 bar (2008 inH ₂ O)	G	• With customer-specific display (setting as specified, Order code "Y21" required)	7
30 bar (435 psi)	H		
Wetted parts materials		Included in delivery of the device:	
(stainless steel process flanges)		• Brief instructions (Leporello)	
Seal diaphragm Parts of measuring cell		• CD-ROM with detailed documentation	
Stainless steel Stainless steel	A	• Sealing plug(s) or sealing screw(s) for the process flanges(s)	
Hastelloy Stainless steel	B		
Gold ¹⁾ Gold	L		
Ausführung als Membrandruckmittler ^{2) 3) 4) 5)}	Y		
Process connection			
Female thread 1/4-18 NPT with flange connection			
• Sealing screw opposite process connection			
- Mounting thread 7/16-20 UNF to IEC 61518	3		
- Mounting thread M12 to DIN 19213 (only for replacement requirement)	1		
• Venting on side of process flanges, location of vent valve at top of process flanges (see dimensional drawing).			
- Mounting thread 7/16-20 UNF to IEC 61518	7		
- Mounting thread M12 to DIN 19213 (only for replacement requirement)	5		
Non-wetted parts materials			
Process flange screws Electronics housing			
Stainless steel Die-cast aluminum	2		
Stainless steel Stainless steel precision casting	3		
Version			
• Standard versions	1		
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	2		
Explosion protection			
• None	A		
• With ATEX, Type of protection:			
- "Intrinsic safety (Ex ia)"	B		
- "Explosion-proof (Ex d) ⁶⁾	D		
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) ⁷⁾	P		
- "Ex nA/ic (Zone 2)" ⁸⁾	E		
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D) ^{7) 9)} (not for DS III FF)	R		
• FM + CSA intrinsic safe (is)	F		
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ⁹⁾	S		
• With FM + CSA, Type of protection:			
- "Intrinsic safety and explosion-proof (is + xp) ⁶⁾ , max PN 360	NC		
Electrical connection/cable entry			
• Screwed gland M20 x 1.5	B		
• Screwed gland 1/2-14 NPT	C		
• M12 connectors (stainless steel) ^{10) 11)}	F		

Display

- Without (display hidden)
- Without visible display (display concealed, setting: bar)
- With visible display (setting: bar)
- With customer-specific display (setting as specified, Order code "Y21" required)

Included in delivery of the device:

- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

- Not in conjunction with max. span 600 mbar (240.9 inH₂O)
- When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.
- If the acceptance test certificate 3.1.is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.
- The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF453-...Y... und 7MF4900-1...-B
- The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.
- Without cable gland, with blanking plug.
- With enclosed cable gland Ex ia and blanking plug.
- Configurations with HAN and M12 connectors are only available in Ex ic.
- Only in connection with IP65.
- Only in connection with Ex approval A, B, E or F.
- M12 delivered without cable socket

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

Selection and Ordering data	Order code		
<i>Further designs</i>	HART	PA	FF
Add "-Z" to Article No. and specify Order code.			
Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:			
• Steel	A01	✓	✓
• Stainless steel	A02	✓	✓
O-rings for process flanges (instead of FPM (Viton))			
• PTFE (Teflon)	A20	✓	✓
• FEP (with silicone core, approved for food)	A21	✓	✓
• FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22	✓	✓
• NBR (Buna N)	A23	✓	✓
Plug			
• Han 7D (metal)	A30	✓	
• Han 8D (instead of Han 7D)	A31	✓	
• Angled	A32	✓	
• Han 8D (metal)	A33	✓	
Sealing screws (2 units) ¼-18 NPT, with valve in mat. of process flanges	A40	✓	✓
Cable sockets for M12 connection (metal (CuZn))	A50	✓	✓
Rating plate inscription (instead of German)			
• English	B11	✓	✓
• French	B12	✓	✓
• Spanish	B13	✓	✓
• Italian	B14	✓	✓
• Cyrillic (russian)	B16	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	B21	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	✓	✓
Inspection certificate Acc. to EN 10204-3.1	C12	✓	✓
Factory certificate Acc. to EN 10204-2.2	C14	✓	✓
Functional safety (SIL2) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓	
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	C21 ¹⁾	✓	
Functional safety (SIL2/3) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓	
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request)	C99	✓	✓
Setting of upper limit of output signal to 22.0 mA	D05	✓	
Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009) (only together with seal diaphragm made of Hastelloy and stainless steel)	D07	✓	✓
Degree of protection IP66/IP68 (only for M20 x 1.5 and ½-14 NPT)	D12	✓	✓
Nom. press. rating PN 500 (MAWP 7250 psi) (Only for measuring cell 600 mbar ... 30 bar (240 inH ₂ O ... 435 psi), SIL- und Ex-options not possible) ²⁾	D56	✓	
Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓

Selection and Ordering data	Order code		
<i>Further designs</i>	HART	PA	FF
Add "-Z" to Article No. and specify Order code.			
Use in or on zone 1D/2D (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B.. Ex ia) and IP65)	E01	✓	✓
Export approval Korea	E11	✓	✓
Dual seal	E24	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25 ³⁾	✓	✓
"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26 ³⁾	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28 ³⁾	✓	✓
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45 ³⁾	✓	✓
Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46 ³⁾	✓	✓
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55 ³⁾	✓	✓
Ex prot. "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56 ³⁾	✓	✓
Explosion-proof "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57 ³⁾	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58 ³⁾	✓	✓
"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]...-Z + E11)	E70 ³⁾	✓	✓
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓
Interchanging of process connection side	H01	✓	✓
Stainless steel process flanges for vertical differential pressure lines	H03	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓
Chambered graphite gasket for process flange	J02	✓	✓
EPDM O-rings for process flange with approval (WRC/WRAS)	J05	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)⁴⁾	J08	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)⁴⁾	J09	✓	✓

¹⁾ Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H

²⁾ Tested according to IEC 61010. Only for measuring materials of the group of fluids 2 in accordance with PED permissible. Not for use with dangerous media suitable.

³⁾ Option does not include ATEX approval, but instead includes only the country-specific approval.

⁴⁾ Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.

Selection and Ordering data	Order code			
Additional data		HART	PA	FF
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text:				
• in the case of linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ ¹⁾	
• in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	Y02	✓		
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 char., specify in plain text: Y16:	Y16	✓	✓	✓
Entry of HART address (TAG) Max. 8 char., specify in plain text: Y17:	Y17	✓		
Setting of pressure indication in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O ¹⁾ , inH ₂ O ¹⁾ , ftH ₂ O ¹⁾ , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or %) ref. temperature 20 °C	Y21	✓	✓	✓
Setting of pressure indication in non-pressure units²⁾ Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" or "Y02" is essential, unit with max. 5 characters)	Y22 + Y01 or Y02	✓		
Preset bus address possible between 1 and 126 Specify in plain text: Y25:	Y25		✓	✓
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓

Factory mounting of valve manifolds, see accessories.

Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset.

✓ = available

¹⁾ Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

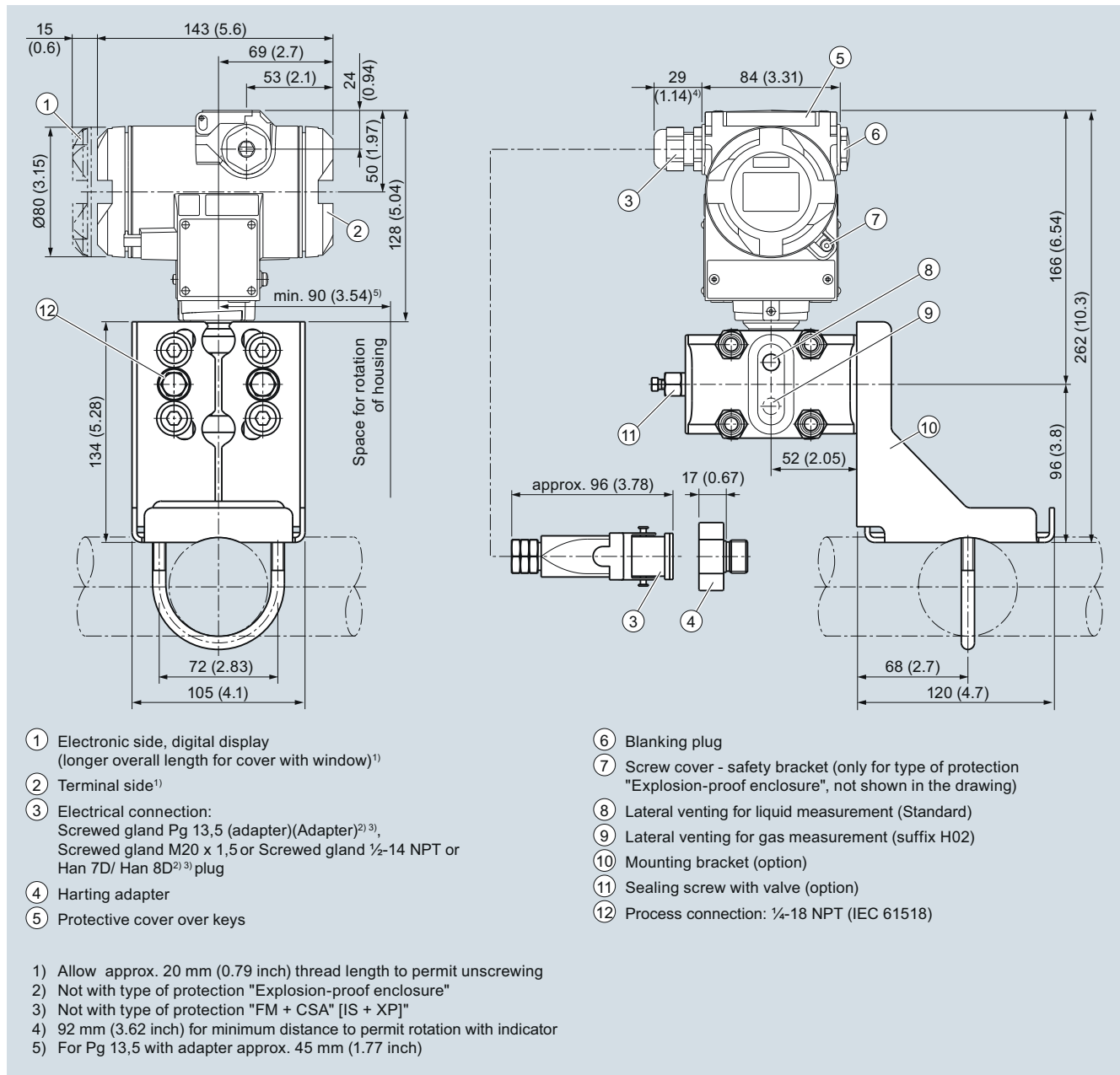
²⁾ Preset values can only be changed over SIMATIC PDM.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

Dimensional drawings



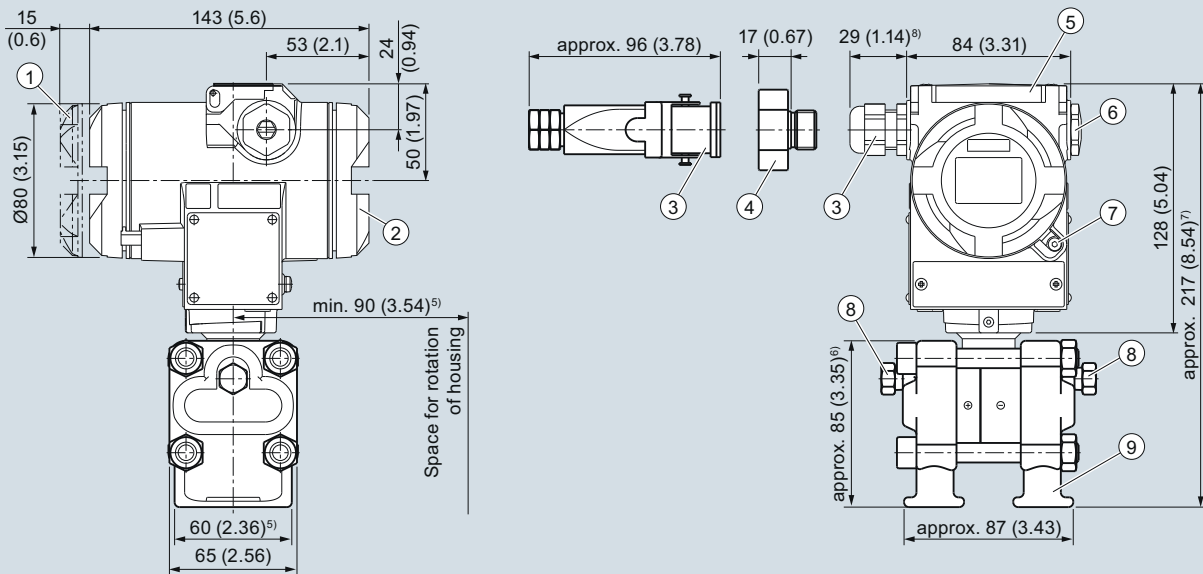
SITRANS P DS III pressure transmitters for differential pressure and flow, dimensions in mm (inch)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for differential pressure and flow

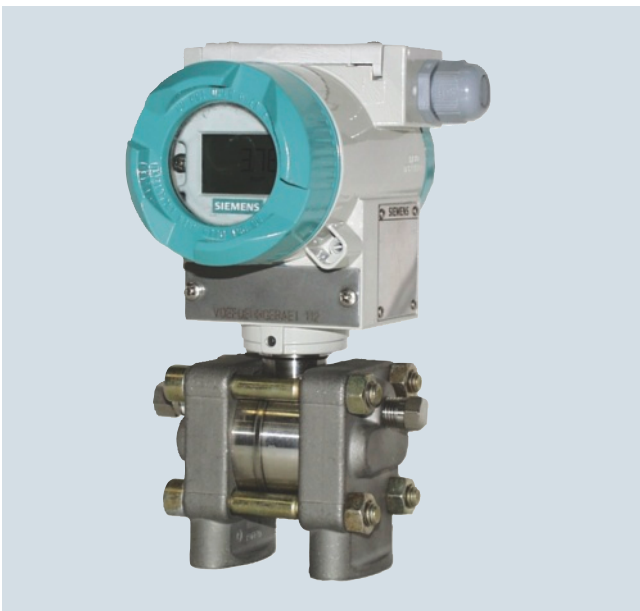
1



- ① Electronic side, digital display (longer overall length for cover with window)¹⁾
- ② Terminal side¹⁾
- ③ Electrical connection: Screwed gland Pg 13,5 (adapter)(Adapter)^{2) 3)}, Screwed gland M20 x 1,5 or Screwed gland ½-14 NPT or Han 7D/ Han 8D^{2) 3)} plug
- ④ Harting adapter
- ⑤ Protective cover over keys
- ⑥ Blanking plug
- ⑦ Screw cover - safety bracket (only for type of protection "Explosion-proof enclosure", not shown in the drawing)
- ⑧ Sealing screw with valve (option)
- ⑨ Process connection: ¼-18 NPT (IEC 61518)

- 1) Allow approx. 20 mm (0.79 inch) thread length to permit unscrewing
- 2) Not with type of protection "Explosion-proof enclosure"
- 3) Not with type of protection "FM + CSA" [IS + XP]"
- 4) 92 mm (3.6 inch) for minimum distance to permit rotation with indicator
- 5) 74 mm (2.9 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- 6) 91 mm (3.6 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- 7) 219 mm (8.62 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- 8) For Pg 13,5 with adapter approx. 45 mm (1.77 inch)

SITRANS P DS III pressure transmitters for differential pressure and flow, with process covers for vertical differential pressure lines, optional "H03", dimensional drawing, dimensions in mm (inch)



SITRANS P DS III pressure transmitters for differential pressure and flow, with process covers for vertical differential pressure lines

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

Technical specifications

SITRANS P DS III for level		PROFIBUS PA or FOUNDATION Fieldbus		
		HART		
Input				
Measured variable	Level			
Spans (infinitely adjustable) or nominal measuring range and max. permissible operating pressure	Span (min. ... max.)	Maximum operating pressure	Nominal measuring range	Maximum operating pressure
	25 ... 250 mbar (10 ... 100 inH ₂ O)	See "Mounting flange"	250 mbar (100 inH ₂ O)	See "Mounting flange"
	25 ... 600 mbar (10 ... 240 inH ₂ O)	See "Mounting flange"	600 mbar (240 inH ₂ O)	See "Mounting flange"
	53 ... 1600 mbar (21 ... 642 inH ₂ O)	See "Mounting flange"	1600 mbar (642 inH ₂ O)	See "Mounting flange"
	160 ... 5000 mbar (64 ... 2000 inH ₂ O)	See "Mounting flange"	5 bar (2000 inH ₂ O)	See "Mounting flange"
Lower measuring limit	-100 % of max. span or 500 mbar a (7.25 psia) Also available as vacuum-resistant remote seal: 30 mbar a (0.44 psi a)			
• Measuring cell with silicone oil filling				
Upper measuring limit	100 % of max. span	100 % of the max. nominal measuring range		
Output				
Output signal	4 ... 20 mA	Digital PROFIBUS PA and FOUNDATION Fieldbus signal		
• Lower limit (infinitely adjustable) • Upper limit (infinitely adjustable)	3.55 mA, factory preset to 3.84 mA	-		
	23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA	-		
Load				
• Without HART	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A in } \Omega$, U_H : Power supply in V	-		
• With HART	$R_B = 230 \dots 500 \Omega$ (SIMATIC PDM) or $R_B = 230 \dots 1100 \Omega$ (HART Communicator)	-		
Physical bus	-	IEC 61158-2		
Protection against polarity reversal	Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.			
Electrical damping (step width 0.1 s)	Set to 2 s (0 ... 100 s)			
Measuring accuracy		Acc. to IEC 60770-1		
Reference conditions (All error data refer always refer to the set span)	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature 25 °C (77 °F)		Nominal measuring range ratio $r = \text{nominal measuring range}/\text{set measuring range}$	
		Span ratio $r = \text{max. span}/\text{set span}$)		
Error in measurement at limit setting incl. hysteresis and reproducibility				
• Linear characteristic				
- $r \leq 10$	$\leq 0.15 \%$	$\leq 0.15 \%$		
- $10 < r \leq 30$	$\leq 0.3 \%$	$\leq 0.3 \%$		
- $30 < r \leq 100$	$\leq (0.0075 \cdot r + 0.075) \%$	$\leq (0.0075 \cdot r + 0.075) \%$		
Long-term stability (temperature change $\pm 30 \text{ }^\circ\text{C}$ ($\pm 54 \text{ }^\circ\text{F}$))	$\leq (0.25 \cdot r) \%$ every 5 years static pressure max. 70 bar (1015 psi)	$\leq (0.25 \cdot r) \%$ every 5 years static pressure max. 70 bar (1015 psi)		
Influence of ambient temperature				
• at -10 ... +60 °C (14 ... 140 °F)				
- 250 mbar- (100 inH ₂ O)-measuring cell	$\leq (0.5 \cdot r + 0.2) \%^{1) 4)}$	$\leq (0.5 \cdot r + 0.2) \%^{1) 4)}$		
- 600 mbar- (240 inH ₂ O)-measuring cell	$\leq (0.3 \cdot r + 0.2) \%^{2) 4)}$	$\leq (0.3 \cdot r + 0.2) \%^{2) 4)}$		
- 1600 and 5000 mbar- (642 and 2000 inH ₂ O)-measuring cell	$\leq (0.25 \cdot r + 0.2) \%^{3) 4)}$	$\leq (0.25 \cdot r + 0.2) \%^{3) 4)}$		
• at -40 ... -10 °C and 60 ... 85 °C (-40 ... +14 °F and 140 ... 185 °F)				
- 250 mbar- (100 inH ₂ O)-measuring cell	$\leq (0.25 \cdot r + 0.15) \% / 10 \text{ K}$ doubled values at $10 < r \leq 30$	$\leq (0.25 \cdot r + 0.15) \% / 10 \text{ K}$ doubled values at $10 < r \leq 30$		
- 600 mbar- (240 inH ₂ O)-measuring cell	$\leq (0.15 \cdot r + 0.15) \% / 10 \text{ K}$ doubled values at $10 < r \leq 30$	$\leq (0.15 \cdot r + 0.15) \% / 10 \text{ K}$ doubled values at $10 < r \leq 30$		
- 1600 and 5000 mbar- (642 and 2000 inH ₂ O)-measuring cell	$\leq (0.12 \cdot r + 0.15) \% / 10 \text{ K}$ double values at $10 < r \leq 30$	$\leq (0.12 \cdot r + 0.15) \% / 10 \text{ K}$ double values at $10 < r \leq 30$		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

1

SITRANS P DS III for level	HART	PROFIBUS PA or FOUNDATION Fieldbus
Influence of static pressure		
<ul style="list-style-type: none"> on the zero point <ul style="list-style-type: none"> - 250 mbar- (100 inH₂O)-measuring cell - 600 mbar- (240 inH₂O)-measuring cell - 1600 and 5000 mbar- (642 and 2000 inH₂O)-measuring cell on the span 	$\leq (0.3 \cdot r) \% \text{ per nominal pressure}$ $\leq (0.15 \cdot r) \% \text{ per nominal pressure}$ $\leq (0.1 \cdot r) \% \text{ per nominal pressure}$ $\leq (0.1 \cdot r) \% \text{ per nominal pressure}$	$\leq (0.3 \cdot r) \% \text{ per nominal pressure}$ $\leq (0.15 \cdot r) \% \text{ per nominal pressure}$ $\leq (0.1 \cdot r) \% \text{ per nominal pressure}$ $\leq (0.1 \cdot r) \% \text{ per nominal pressure}$
Measured Value Resolution	-	$3 \cdot 10^{-5}$ of nominal measuring range
Rated conditions		
Degree of protection to IEC 60529	IP66 (optional IP66/IP68), NEMA 4X	
Temperature of medium	Note: Always take into account assignment of max. permissible operating temperature to max. permissible operating pressure of the respective flange connection! $-40 \dots +100^{(5)} \text{ } ^\circ\text{C}$ ($-40 \dots +212^{(5)} \text{ } ^\circ\text{F}$) $p_{\text{abs}} \geq 1 \text{ bar: } -40 \dots +175 \text{ } ^\circ\text{C}$ ($-40 \dots +347 \text{ } ^\circ\text{F}$) $p_{\text{abs}} < 1 \text{ bar: } -40 \dots +80 \text{ } ^\circ\text{C}$ ($-40 \dots +176 \text{ } ^\circ\text{F}$) $-40 \dots +100 \text{ } ^\circ\text{C}$ ($-40 \dots +212 \text{ } ^\circ\text{F}$) $-20 \dots +60 \text{ } ^\circ\text{C}$ ($-4 \dots +140 \text{ } ^\circ\text{F}$) in conjunction with dust explosion protection	
<ul style="list-style-type: none"> Measuring cell with silicone oil filling <ul style="list-style-type: none"> - High-pressure side - Low-pressure side 		
Ambient conditions		
<ul style="list-style-type: none"> Ambient temperature <ul style="list-style-type: none"> - Transmitter (with 4-wire connection, observe temperature values of supplementary 4-wire electronics) - Display readable Storage temperature Climatic class <ul style="list-style-type: none"> - Condensation Electromagnetic Compatibility <ul style="list-style-type: none"> - Emitted interference and interference immunity 	$-40 \dots +85 \text{ } ^\circ\text{C}$ ($-40 \dots +185 \text{ } ^\circ\text{F}$) $-30 \dots +85 \text{ } ^\circ\text{C}$ ($-22 \dots +185 \text{ } ^\circ\text{F}$) $-50 \dots +85 \text{ } ^\circ\text{C}$ ($-58 \dots +185 \text{ } ^\circ\text{F}$)	Relative humidity 0 ... 100 %, condensation permissible, suitable for use in the tropics Acc. to IEC 61326 and NAMUR NE 21
Design		
Weight (without options)		
<ul style="list-style-type: none"> To EN (pressure transmitter with mounting flange, without tube) To ASME (pressure transmitter with mounting flange, without tube) 	$\approx 11 \dots 13 \text{ kg}$ ($\approx 24.2 \dots 28.7 \text{ lb}$) $\approx 11 \dots 18 \text{ kg}$ ($\approx 24.2 \dots 39.7 \text{ lb}$)	
Enclosure material	Low-copper die-cast aluminum, GD-AlSi12 or stainless steel precision casting, mat. no. 1.4408	
Wetted parts materials		
High-pressure side		
<ul style="list-style-type: none"> Seal diaphragm of mounting flange 	Stainless steel, mat. no. 1.4404/316L, Monel, mat. no. 2.4360, Hastelloy B2, mat. no. 2.4617, Hastelloy C276, mat. no. 2.4819, Hastelloy C4, mat. no. 2.4610, tantalum, PTFE, ETCFE, stainless steel Duplex, mat. no. 1.4462	
Measuring cell filling	Silicone oil	
Process connection		
<ul style="list-style-type: none"> High-pressure side Low-pressure side 	Flange to EN and ASME Female thread 1/4-18 NPT and flange connection with mounting thread M10 to DIN 19213 or 1/16-20 UNF to EN 61518	
Power supply U_H		
Terminal voltage on transmitter	$10.5 \dots 45 \text{ V DC}$ $10.5 \dots 30 \text{ V DC}$ in intrinsically-safe mode	Supplied through bus
Separate 24 V power supply necessary	-	No
Bus voltage		
<ul style="list-style-type: none"> Not Ex With intrinsically-safe operation 	-	$9 \dots 32 \text{ V}$ $9 \dots 24 \text{ V}$
Current consumption		
<ul style="list-style-type: none"> Basic current (max.) Start-up current \leq basic current Max. current in event of fault 	-	12.5 mA Yes 15.5 mA
Fault disconnection electronics (FDE) available	-	Yes

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

SITRANS P DS III for level

	HART	PROFIBUS PA or FOUNDATION Fieldbus
Certificates and approvals		
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	
Explosion protection		
• Intrinsic safety "i"		PTB 13 ATEX 2007 X
- Marking		Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb
- Permissible ambient temperature		-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +70 °C (-40 ... +158 °F) temperature class T5; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$; $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion-proof "d"		PTB 99 ATEX 1160
- Marking		Ex II 1/2 G Ex d IIC T4/T6 Gb
- Permissible ambient temperature		-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$
• Dust explosion protection for zone 20		PTB 01 ATEX 2055
- Marking		Ex II 1 D IP65 T 120 °C Ex II 1/2 D IP65 T 120 °C
- Permissible ambient temperature		-40 ... +85 °C (-40 ... +185 °F)
- Max. surface temperature		120 °C (248 °F)
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$, $I_o = 380 \text{ mA}$, $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$, $I_o = 250 \text{ mA}$, $P_o = 1.2 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Dust explosion protection for zone 21/22		PTB 01 ATEX 2055
- Marking		Ex II 2 D IP65 T 120 °C
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$; $P_{\text{max}} = 1.2 \text{ W}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$; $P_{\text{max}} = 1 \text{ W}$
• Type of protection "n" (zone 2)		PTB 13 ATEX 2007 X
- Marking		Ex II 2/3 G Ex nA II T4/T5/T6 Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc
- Connection (Ex nA)	$U_m = 45 \text{ V}$	$U_m = 32 \text{ V}$
- Connection (Ex ic)	To circuits with values: $U_i = 45 \text{ V}$	FISCO supply unit ic: $U_o = 17.5 \text{ V}$, $I_o = 570 \text{ mA}$ Linear barrier: $U_o = 32 \text{ V}$, $I_o = 132 \text{ mA}$, $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$, $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$, $C_i = 1.1 \text{ nF}$
• Explosion protection acc. to FM		Certificate of Compliance 3008490
- Identification (XP/DIP) or (IS); (NI)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	
• Explosion protection to CSA		Certificate of Compliance 1153651
- Identification (XP/DIP) or (IS)	CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III	

1) Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.4 · r + 0.16) % / 28 °C (50 °F).

2) Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.24 · r + 0.16) % / 28 °C (50 °F).

3) Conversion of temperature error per 28 °C. Valid for temperature range -3 ... +53 °C < (0.2 · r + 0.16) % / 28 °C (50 °F).

4) 0.32 instead of 0.16 at $10 < r < 30$

5) This value may be increased if the process connection is sufficiently insulated.

HART communication		FOUNDATION Fieldbus communication	
HART	230 ... 1100 Ω	Function blocks	3 function blocks analog input, 1 function block PID
Protocol	HART Version 5.x	• Analog input	Yes, linearly rising or falling characteristic
Software for computer	SIMATIC PDM	- Adaptation to customer-specific process variables	0 ... 100 s
PROFIBUS PA communication		- Electrical damping, adjustable	Output/input (can be locked within the device with a bridge)
Simultaneous communication with master class 2 (max.)	4	- Simulation function	parameterizable (last good value, substitute value, incorrect value)
The address can be set using	Configuration tool or local operation (standard setting address 126)	- Failure mode	Yes, one upper and lower warning limit and one alarm limit respectively
Cyclic data usage		- Limit monitoring	Yes
• Output byte	5 (one measured value) or 10 (two measured values)	- Square-rooted characteristic for flow measurement	Standard FOUNDATION Fieldbus function block
• Input byte	0, 1, or 2 (register operating mode and reset function for metering)	• PID	1 resource block
Internal preprocessing		• Physical block	1 transducer block Pressure with calibration, 1 transducer block LCD
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	Transducer blocks	
Function blocks	2	• Pressure transducer block	
• Analog input		- Can be calibrated by applying two pressures	Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	- Monitoring of sensor limits	Yes
- Electrical damping, adjustable	0 ... 100 s	- Simulation function: Measured pressure value, sensor temperature and electronics temperature	Constant value or over parameterizable ramp function
- Simulation function	Input/Output	Mounting flange	
- Failure mode	parameterizable (last good value, substitute value, incorrect value)	Nominal diameter	Nominal pressure
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively	• Acc. to EN 1092-1	
• Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output	- DN 80	PN 40
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)	- DN100	PN16, PN40
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively	• To ASME B16.5	
• Physical block	1	- 3 inch	class 150, class 300
Transducer blocks	2	- 4 inch	class 150, class 300
• Pressure transducer block			
- Can be calibrated by applying two pressures	Yes		
- Monitoring of sensor limits	Yes		
- Specification of a container characteristic with	Max. 30 nodes		
- Square-rooted characteristic for flow measurement	Yes		
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable		
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function		

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

1

Selection and Ordering data		Article No.
Pressure transmitter for level, SITRANS P DS III with HART		7MF4633 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		Y -
Measuring cell filling	Measuring cell cleaning	1
Silicone oil	normal	
Measuring span (min. ... max.)		D
25 ... 250 mbar	(10 ... 100 inH ₂ O)	E
25 ... 600 mbar	(10 ... 240 inH ₂ O)	F
53 ... 1600 mbar	(21 ... 642 inH ₂ O)	G
0.16 ... 5 bar	(64.3 ... 2000 inH ₂ O)	
Process connection of low-pressure side		2
Female thread 1/4-18 NPT with flange connection		0
<ul style="list-style-type: none"> Mounting thread 7/16-20 UNF to IEC 61518 Mounting thread M10 to DIN 19213 (only for replacement requirement) 		
Non-wetted parts materials		2
process flange screws	Electronics housing	3
Stainless steel	Die-cast aluminum	
Stainless steel	Stainless steel precision casting ¹⁾	
Version		1
<ul style="list-style-type: none"> Standard versions International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable) 		2
Explosion protection		A
<ul style="list-style-type: none"> None With ATEX, Type of protection: <ul style="list-style-type: none"> "Intrinsic safety (Ex ia)" "Explosion-proof (Ex d)"²⁾ "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)³⁾ "Ex nA/ic (Zone 2)"⁴⁾ "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)"³⁾⁵⁾ FM + CSA intrinsic safe (is) FM + CSA (is + ep) + Ex ia + Ex d (ATEX)⁵⁾ With FM + CSA, Type of protection: <ul style="list-style-type: none"> "Intrinsic Safe und Explosion Proof (is + xp)"¹⁾ 		B D P E R
Electrical connection/cable entry		F S NC
<ul style="list-style-type: none"> Screwed gland Pg 13.5⁶⁾ Screwed gland M20x1.5 Screwed gland 1/2-14 NPT Han 7D plug (plastic housing) incl. mating connector⁶⁾ M12 connectors (stainless steel)^{7) 8)} 		A B C D F
Display		0 1 6 7
<ul style="list-style-type: none"> Without display Without visible display (display concealed, setting: mA) With visible display (setting: mA) With customer-specific display (setting as specified, Order code "Y21" or "Y22" required) 		

Ordering information

1st order item: Pressure transmitter 7MF4633-...
2nd order item: Mounting flange 7MF4912-3...

ordering example

Item line 1: 7MF4633-1EY20-1AA1-Z
B line: Y01
C line: Y01: 80 to 143 mbar (1.16 to 2.1 psi)
Item line 2: 7MF4912-3GE01

Power supply units see Chap. 7 "Supplementary Components".

Included in delivery of the device:

- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

- Not in conjunction with electrical connection "Screwed gland Pg 13.5" and "Han7D plug".
- Without cable gland, with blanking plug.
- With enclosed cable gland Ex ia and blanking plug.
- Configurations with HAN and M12 connectors are only available in Ex ic.
- Only in connection with IP65.
- Only in connection with Ex approval A, B or E.
- M12 delivered without cable socket
- Only in connection with Ex approval A, B, E or F.

Selection and Ordering data	Article No.
Pressure transmitters for level	
SITRANS P DS III with PROFIBUS PA (PA)	7MF4634-
SITRANS P DS III with FOUNDATION Fieldbus (FF)	7MF4635-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	1 Y -
Nominal measuring range	
250 mbar (100 inH ₂ O)	D
600 mbar (240 inH ₂ O)	E
1600 mbar (642 inH ₂ O)	F
5 bar (2000 inH ₂ O)	G
Process connection of low-pressure side	
Female thread 1/4-18 NPT with flange connection	
• Mounting thread 7/16-20 UNF to IEC 61518	2
• Mounting thread M10 to DIN 19213 (only for replacement requirement)	0
Non-wetted parts materials	
process flange screws Electronics housing	
Stainless steel Die-cast aluminum	2
Stainless steel Stainless steel precision casting	3
Version	
• Standard versions	1
• International version, English label inscriptions, documentation in 5 languages on CD (no Order code selectable)	2
Explosion protection	
• None	A
• With ATEX, Type of protection:	
- "Intrinsic safety (Ex ia)"	B
- "Explosion-proof (Ex d) ^{*1)}	D
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) ^{*2)}	P
- "Ex nA/c (Zone 2) ^{* 3)}	E
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D) ^{*2)4)} (not for DS III FF)	R
• FM + CSA intrinsic safe (is)	F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) ⁴⁾	S
• With FM + CSA, Type of protection:	
- "Intrinsic Safe und Explosion Proof (is + xp) ^{*1)}	NC
Electrical connection/cable entry	
• Screwed gland M20 x 1.5	B
• Screwed gland 1/2-14 NPT	C
• M12 connectors (stainless steel) ^{5) 6)}	F
Display	
• Without display	0
• Without visible display (display concealed, setting: bar)	1
• With visible display (setting: bar)	6
• With customer-specific display (setting as specified, Order code "Y21" required)	7

Ordering information

1st order item: Pressure transmitter 7MF4634-...
2nd order item: Mounting flange 7MF4912-...

ordering example

Item line 1: 7MF4634-1EY20-1AA1
Item line 2: 7MF4912-3GE01

Included in delivery of the device:

- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

- 1) Without cable gland, with blanking plug.
- 2) With enclosed cable gland Ex ia and blanking plug.
- 3) Configurations with HAN and M12 connectors are only available in Ex ic.
- 4) Only in connection with IP65.
- 5) M12 delivered without cable socket
- 6) Only in connection with Ex approval A, B, E or F.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

Selection and Ordering data	Order code		
<i>Further designs</i>	HART	PA	FF
Add "-Z" to Article No. and specify Order code.			
O-rings for process flanges on low-pressure side (instead of FPM (Viton))			
• PTFE (Teflon)	A20	✓	✓
• FEP (with silicone core, approved for food)	A21	✓	✓
• FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22	✓	✓
• NBR (Buna N)	A23	✓	✓
Plug			
• Han 7D (metal)	A30	✓	
• Han 8D (instead of Han 7D)	A31	✓	
• Angled	A32	✓	
• Han 8D (metal)	A33	✓	
Sealing screw ¼-18 NPT, with valve in mat. of process flanges	A40	✓	✓
Cable sockets for M12 connectors (metal (CuZn))	A50	✓	✓
Rating plate inscription (instead of German)			
• English	B11	✓	✓
• French	B12	✓	✓
• Spanish	B13	✓	✓
• Italian	B14	✓	✓
• Cyrillic (russian)	B16	✓	✓
English rating plate Pressure units in inH ₂ O and/or psi	B21	✓	✓
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	✓	✓
Inspection certificate Acc. to EN 10204-3.1	C12	✓	✓
Factory certificate Acc. to EN 10204-2.2	C14	✓	✓
Functional safety (SIL2) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓	
Functional safety (PROFIsafe) Certificate and PROFIsafe protocol	C21¹⁾		✓
Functional safety (SIL2/3) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓	
Device passport Russia (For price request please contact the technical support www.siemens.com/automation/support-request)	C99	✓	✓
Setting of upper limit of output signal to 22.0 mA	D05	✓	
Degree of protection IP66/IP68 (only for M20x1.5 and ½-14 NPT)	D12	✓	✓
Supplied with oval flange (1 item), PTFE packing and screws in thread of process flange	D37	✓	✓
Capri cable gland 4F CrNi and clamping device (848699 + 810634) included	D59	✓	✓

Selection and Ordering data	Order code		
<i>Further designs</i>	HART	PA	FF
Add "-Z" to Article No. and specify Order code.			
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B.. Ex ia) and IP65)	E01	✓	✓
Overfilling safety device for flammable and non-flammable liquids (max. PN 32 (MAWP 464 psi), basic device with type of protection "Intrinsic safety (Ex ia)", to WHG and VbF, not together with measuring cell filling "inert liquid")	E08	✓	
Export approval Korea	E11	✓	✓
CRN approval Canada (Canadian Registration Number)	E22	✓	✓
Dual seal	E24	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-B..)	E25²⁾	✓	✓
"Flameproof" explosion protection according to INMETRO (Brazil) (only for transmitter 7MF4...-.....-D..)	E26²⁾	✓	✓
Explosion-proof "Intrinsic safety" (Ex ia + Ex d) to INMETRO (Brazil) (only for transmitter 7MF4...-.....-P..)	E28²⁾	✓	✓
Ex Approval IEC Ex (Ex ia) (only for transmitter 7MF4...-.....-B..)	E45²⁾	✓	✓
Ex Approval IEC Ex (Ex d) (only for transmitter 7MF4...-.....-D..)	E46²⁾	✓	✓
Explosion-proof "Intrinsic safety" to NEPSI (China) (only for transmitter 7MF4...-.....-B..)	E55²⁾	✓	✓
Explosion protection "Explosion-proof" to NEPSI (China) (only for transmitter 7MF4...-.....-D..)	E56²⁾	✓	✓
Ex protection "Zone 2" to NEPSI (China) (only for transmitter 7MF4...-.....-E..)	E57²⁾	✓	✓
Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China) (only for transmitter 7MF4...-.....-R..)	E58²⁾	✓	✓
"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (only for transmitter 7MF4...-.....-[B, D]...-Z + E11)	E70²⁾	✓	✓
Two coats of lacquer on casing and cover (PU on epoxy)	G10	✓	✓
Replacement of process connection side	H01	✓	✓
Transient protector 6 kV (lightning protection)	J01	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)³⁾	J08	✓	✓
Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)³⁾	J09	✓	✓

1) Profisafe transmitters can only be operated with the S7 F Systems V6.1 configuration software in combination with S7-400H

2) Option beinhaltet keine ATEX-Zulassung, sondern nur die landesspezifische Zulassung.

3) Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.

Selection and Ordering data	Order code			
		HART	PA	FF
Additional data				
Please add "-Z" to Article No. and specify Order code(s) and plain text.				
Measuring range to be set Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ ¹⁾	
Stainless steel tag plate and entry in device variable (measuring point description) Max. 16 characters, specify in plain text: Y15:	Y15	✓	✓	✓
Measuring point text (entry in device variable) Max. 27 characters, specify in plain text: Y16:	Y16	✓	✓	✓
Entry of HART address (TAG) Max. 8 characters, specify in plain text: Y17:	Y17	✓		
Setting of pressure indicator in pressure units Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H ₂ O ¹⁾ , inH ₂ O ¹⁾ , ftH ₂ O ¹⁾ , mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM or % ¹⁾ ref. temperature 20 °C	Y21	✓	✓	✓
Setting of pressure indicator in non-pressure units²⁾ Specify in plain text: Y22: up to l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	Y22 ³⁾ + Y01	✓		
Preset bus address possible between 1 and 126 Specify in plain text: Y25:	Y25		✓	✓
Damping adjustment in seconds (0 ... 100 s)	Y30	✓	✓	✓

Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset

✓ = available

- 1) Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.
- 2) Preset values can only be changed over SIMATIC PDM.
- 3) Not in conjunction with over-filling safety device for flammable and non-flammable liquids (Order code "E08")

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

1

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data			Order code		
Mounting flange		7 MF 4 9 1 2 -		Further designs			HART PA FF		
Directly mounted on the SITRANS P pressure transmitter (converter part) for level, for DS III series		3		Add "-Z" to Article No. and specify Order code.					
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Spark arrester			A01		
				For mounting on zone 0 (incl. documentation)			✓ ✓ ✓		
Connection to EN 1092-1				Remote seal nameplate			B20		
Nominal diameter	Nominal pressure			attached out of stainless steel, contains Article No. and order number of the remote seal supplier			✓ ✓ ✓		
DN 50	PN 10/16/25/40 PN 100	A		Oil- and grease-free cleaned version			C10		
DN 80	PN 10/16/25/40	B		Oil- and grease-free cleaned and packed version, not for oxygen application, only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2			✓ ✓ ✓		
DN 100	PN 10/16 PN 25/40	D		Quality inspection certificate (Five-step factory calibration) to IEC 60770-2			C11		
		G		Inspection certificate			C12		
		H		Acc. to EN 10204-3.1			✓ ✓ ✓		
Connection to ASME B16.5				2.2 Certificate of FDA approval of fill oil			C17		
Nominal diameter	Nominal pressure			Only in conjunction with filling liquid "Food oil" (FDA listed)"			✓ ✓ ✓		
2 inch	class 150 class 300 class 400/600 class 900/1500	L		"Functional safety (SIL2)" certificate to IEC 61508			C20		
3 inch	class 150 class 300	M		(only for conjunction with the Order code "C20" in the case of SITRANS P DS III transmitter)			✓ ✓		
4 inch	class 150 class 300	N		"Functional safety (SIL2/3)" certificate to IEC 61508			C23		
		P		(only for conjunction with the Order code "C23" in the case of SITRANS P DS III transmitter)			✓ ✓		
		Q		Certification acc. to NACE MR-0175			D07		
		R		Includes acceptance test certificate 3.1 acc. to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)			✓ ✓ ✓		
		S		Certification acc. to NACE MR-0103			D08		
Other version, add Order code and plain text: Nominal diameter: ...; Nominal press.: ...		T		Includes acceptance test certificate 3.1 acc. to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)			✓ ✓ ✓		
		U		Oil- and grease-free cleaned version			E10		
		Z	J 1 Y	Oil- and grease-free cleaned and packed version, only for oxygen application, only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2			✓ ✓ ✓		
Wetted parts materials				Epoxy painting			E15		
• Stainless steel 316L		A		Not possible with vacuum-proof design			✓ ✓ ✓		
- Coated with PFA		D		Color: transparent, coverage: front and rear of the remote seal, capillary(ies) or connecting tube, process connection of the transmitter. With transmitters 7MF40.. and 7MF42.., only possible with process connection G½B according to EN837-1.					
- Coated with PTFE		E		Sealing surface B1 or ASME B16.5 RF 125 ... 250 AA			J12		
• Coated with ECTFE ¹⁾		F		instead of sealing surface B2 or RFSF (only for wetted parts made of Hastelloy C276 (2.4819), tantalum and Duplex 2205 (1.4462) and for nominal sizes 2", 3", DN 50 and DN 80)			✓ ✓ ✓		
• Monel 400, mat. no. 2.4360		G		Sealing surface groove, EN 1092-1, form D			J14		
• Hastelloy C276, mat. no. 2.4819		J		instead of sealing surface B1 (only for wetted parts made of stainless steel 316L)			✓ ✓ ✓		
• Hastelloy C4, mat. no. 2.4610		K		Sealing surface RJF (groove) ASME B16.5			J24		
• Tantalum		U		instead of sealing surface ASME B16.5 RF 125 ... 250 AA (only for wetted parts made of stainless steel 316L)			✓ ✓ ✓		
• Duplex 2205, mat. no. 1.4462		Q							
• Duplex 2205, mat. no. 1.4462, incl. main body		R							
• Stainless steel 316L, gold plated, thickness approx. 25 µm		S							
Tube length									
• None		0							
• 50 mm (1.97 inch)		1							
• 100 mm (3.94 inch)		2							
• 150 mm (5.90 inch)		3							
• 200 mm (7.87 inch)		4							
Other version: add Order code and plain text: material of parts in contact with medium:, tubus length:		Z	K 1 Y						
Filling liquid									
• Silicone oil M5		1							
• Silicone oil M50		2							
• High-temperature oil		3							
• Halocarbon oil (for O ₂ -measurement)		4							
• Food oil (FDA-listed)		7							
Other version, add Order code and plain text: filling liquid: ...		9	M 1 Y						

1) For vacuum on request

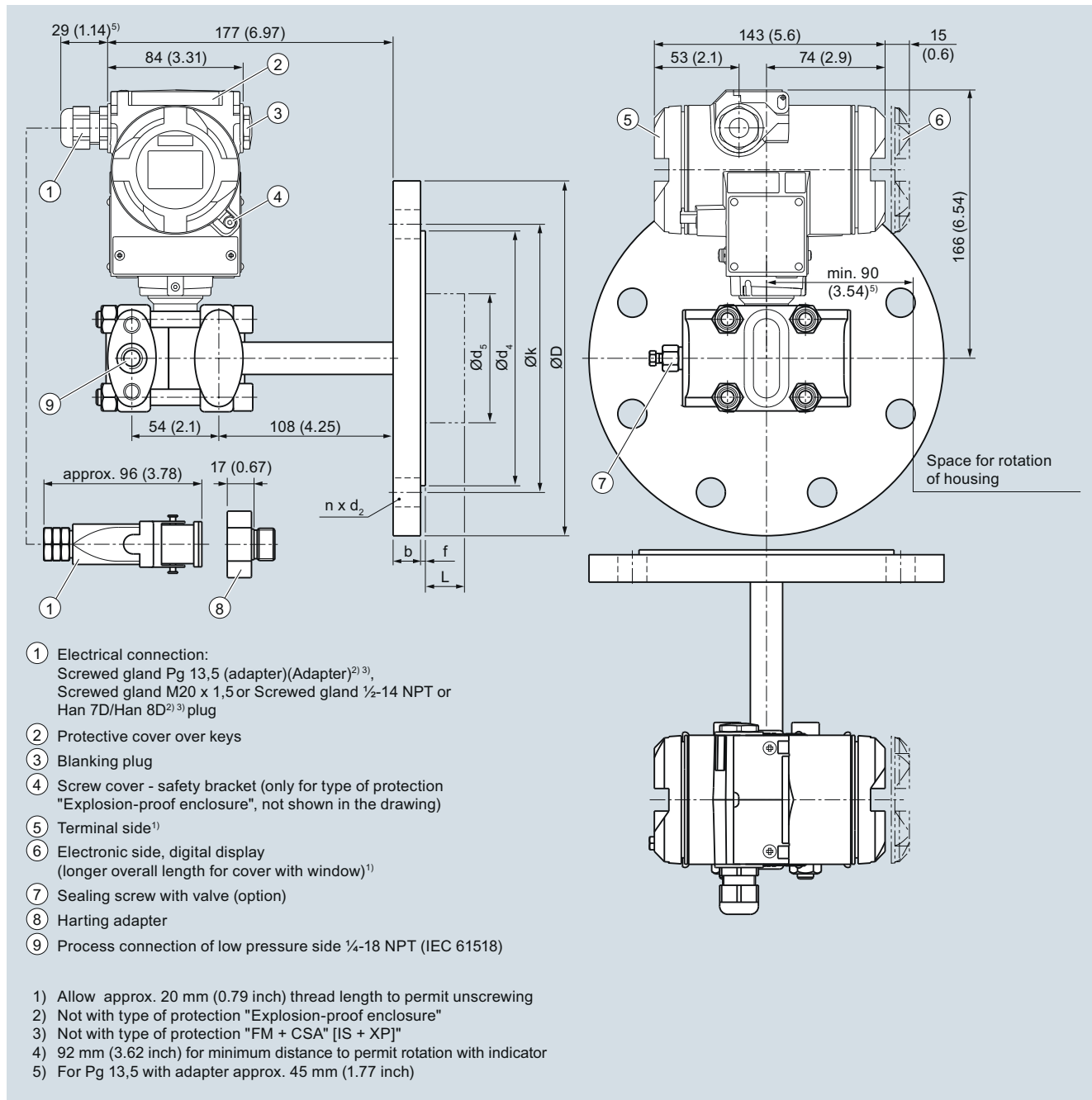
Selection and Ordering data	Order code			
<i>Further designs</i>		HART	PA	FF
Add "-Z" to Article No. and specify Order code.				
Elongated pipe, 150 mm instead of 100 mm, max. medium temperature 250 °C, observe the maximum permissible media temperature of the filling liquid.	R15	✓	✓	✓
Elongated pipe, 200 mm instead of 100 mm, max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.	R20	✓	✓	✓
Vacuum-proof design (for use in low-pressure range) Note: suffix "Y01" required with press. transm. ✓ = available	V04	✓	✓	✓

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

Dimensional drawings



SITRANS P DS III with HART pressure transmitters for level, including mounting flange, dimensions in mm (inch)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III for level

1

Connection to EN 1092-1

Nominal diameter	Nominal pressure	b	D	d	d ₂	d ₄	d ₅	d _M	f	k	n	L
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
DN 50	PN 10/16/25/40	20	165	90	18	102	48.3	45 ¹⁾	2	125	8	0, 50, 100, 150 or 200
	PN 100	28	195	90	26	102	48.3	45 ¹⁾	2	145	8	
DN 80	PN 10/16/25/40	24	200	90	18	138	76	72 ²⁾	2	160	8	
	PN 100	32	230	90	26	138	76	72 ²⁾	2	180	8	
DN 100	PN 10/16	20	220	115	18	158	94	89	2	180	8	
	PN 25/40	24	235	115	22	162	94	89	2	190	8	

Connection to ASME B16.5

Nominal diameter	Nominal pressure	b	D	d ₂	d ₄	d ₅	d _M	f	k	n	L
		lb./sq.in	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)
2 inch	150	0.77 (19.5)	5.91 (150)	0.79 (20)	3.62 (92)	1.9 (48.3)	1.77 ¹⁾ (45)	0.08 (2)	4.74 (120.5)	4	0, 2, 3.94, 5.94 or 7.87 (0, 50, 100, 150 or 200)
	300	0.89 (22.7)	6.5 (165)	0.79 (20)	3.62 (92)	1.9 (48.3)	1.77 ¹⁾ (45)	0.08 (2)	5 (127)	8	
	400/600	1.28 (32.4)	6.5 (165)	0.79 (20)	3.62 (92)	1.9 (48.3)	1.77 ¹⁾ (45)	0.28 (7)	5 (127)	8	
	900/1500	1.78 (45.1)	8.46 (215)	1.02 (26)	5 (127)	1.9 (48.3)	1.77 ¹⁾ (45)	0.28 (7)	6.5 (165)	8	
3 inch	150	0.96 (24.3)	7.48 (190)	0.79 (20)	5 (127)	3 (76)	2.83 ²⁾ (72)	0.08 (2)	6 (152.5)	4	
	300	1.14 (29)	8.27 (210)	0.87 (22)	5 (127)	3 (76)	2.83 ²⁾ (72)	0.08 (2)	6.63 (168.5)	8	
	600	1.53 (38.8)	8.27 (210)	0.87 (22)	5 (127)	3 (76)	2.83 ²⁾ (72)	0.28 (7)	6.63 (168.5)	8	
4 inch	150	0.96 (24.3)	9.06 (230)	0.79 (20)	6.22 (158)	3.69 (94)	3.5 (89)	0.08 (2)	7.5 (190.5)	8	
	300	1.27 (32.2)	10.04 (255)	0.87 (22)	6.22 (158)	3.69 (94)	3.5 (89)	0.08 (2)	7.87 (200)	8	
	400	1.65 (42)	10.04 (255)	1.02 (26)	6.22 (158)	3.69 (94)	3.5 (89)	0.28 (7)	7.87 (200)	8	

d: Internal diameter of gasket to DIN 2690

d_M: Effective diaphragm diameter

¹⁾ 59 mm = 2.32 inch with tube length L=0.

²⁾ 89 mm = 3½ inch with tube length L=0.

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Supplementary electronics for 4-wire connection

Overview



Direct connection of the supplementary electronics to a SITRANS P DS III pressure transmitter with HART produces a transmitter for 4-wire connection.

The supplementary electronics cannot be attached to explosion-protected pressure transmitters. The supplementary electronics is fitted in a light metal housing which is mounted on the left side of the pressure transmitter.

Note on ordering:

The supplementary electronics can only be ordered as an **optional accessory** for the corresponding pressure transmitter.

Technical specifications

SITRANS P, supplementary electronics for 4-wire connection

Output

Output signal	0 ... 20 mA or 4 ... 20 mA
Load	Max. 750 Ω
Voltage measurement	Linear (square-rooting in transmitter if necessary)
Electrical isolation	Between power supply and input/ output

Measuring accuracy

	acc. to IEC 60770-1
Measurement deviation (in addition to transmitter)	≤ 0.15 % of set span
Influence of ambient temperature	≤ 0.1 % per 10 K
Power supply effect	≤ 0.1 % per 10 % change in voltage or frequency
Load effect	≤ 0.1 % per 100 % change

Rated conditions

Ambient temperature	
• 24 V version	-20 ... +80 °C (-4 ... +176 °F)
• 230 V version	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
Degree of protection	IP54 to IEC 60529
Electromagnetic compatibility (EMC)	IEC 61236
Condensation	Relative humidity 0 ... 95 % condensation permissible

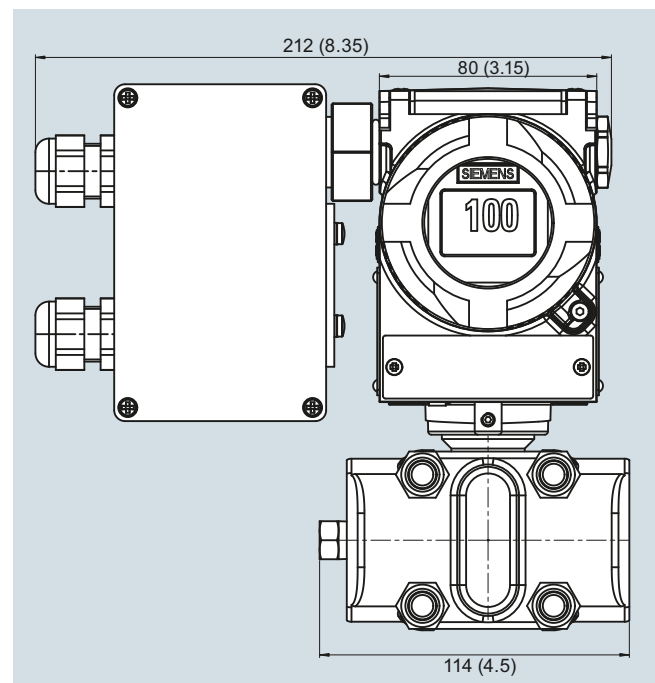
Structural design

Dimensions (W x H x D) in mm (inch)	80 x 120 x 60 (3.15 x 4.72 x 2.36)
Electrical connection	Screw terminals (Pg 13.5 cable inlet) or Han 7D / Han 8D plug

Power supply

Supply voltage	230 V AC (-10 ... +6 %, 47 ... 63 Hz, approx. 6 VA) or 24 V AC/DC (24 V AC ± 10 %, 47 ... 63 Hz, approx. 3 VA)
Permissible ripple (within the specified limits)	Approx. 2.5 V _{pp}

Dimensional drawings



SITRANS P pressure transmitters with supplementary electronics for four-wire connection, dimension drawing, dimensions in mm

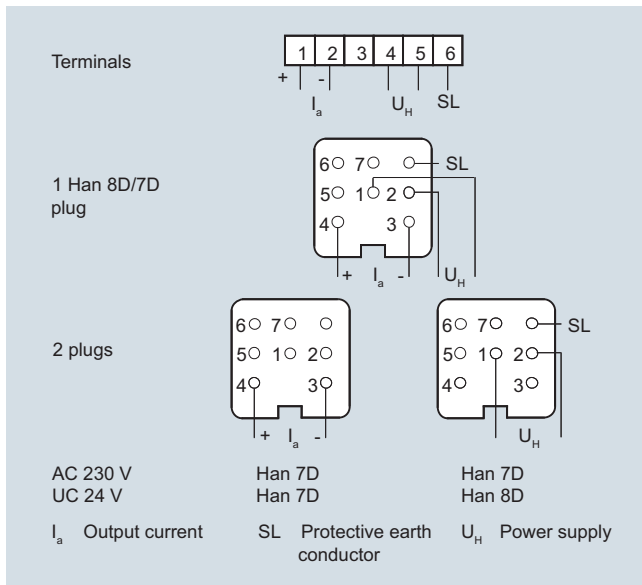
Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Supplementary electronics for 4-wire connection

1

Schematics



Supplementary electronics for 4-wire connection, connection diagram

Selection and Ordering data

Order code

Supplementary electronics for 4-wire connection

Article No. of the transmitter
7MF4.33-.....-AB, add "**Z**" and Order code.

Power supply	Electrical connection	Order code
24 V AC/DC	Terminals; 2 Pg screwed glands, to left	1
	2 Han 7D/Han 8D plugs incl. mating connector, to left	3
	1 Han 7D plug incl. mating connector, angled	5
	Terminals; 1 Pg screwed gland, downwards	6
	1 Han 8D plug incl. mating connector, downwards (observe arrangement of plug and differential pressure line)	9
230 V AC	Terminals; 2 Pg screwed glands, to left	7
	2 Han 7D plugs incl. mating connector, to left	8

Output current

0 ... 20 mA
 4 ... 20 mA

0
 1

Accessories

Instruction Manual
 German/English

A5E00322799

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Accessories/Spare Parts

1

Selection and Ordering data	Article No.
Replacement measuring cell for pressure for SITRANS P DS III	7MF4990 - 0-0DB0
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	
Measuring cell filling Measuring cell cleaning	
Silicone oil Normal	1
Inert liquid grease-free to cleanliness level 2	3
Measured span (min. ... max.)	
0.01 ... 1 bar (0.15 ... 14.5 psi)	B
0.04 ... 4 bar (0.6 ... 58 psi)	C
0.16 ... 16 bar (2.32 ... 232 psi)	D
0.63 ... 63 bar (9.14 ... 914 psi)	E
1.6 ... 160 bar (23.2 ... 2320 psi)	F
4.0 ... 400 bar (58.0 ... 5802 psi)	G
7.0 ... 700 bar (102.0 ... 10153 psi)	J
Wetted parts materials	
Seal diaphragm Process connection	
Stainless steel Stainless steel	A
Hastelloy Stainless steel	B
Hastelloy Hastelloy	C
Process connection	
• Connection shank G $\frac{1}{2}$ B to EN 837-1	0
• Female thread $\frac{1}{2}$ -14 NPT	1
• Oval flange made of stainless steel, max. span 160 bar (2320 psi)	
- Mounting thread $\frac{7}{16}$ -20 UNF to IEC 61518	2
- Mounting thread M10 to DIN 19213	3
Further designs	Order code
Please add "-Z" to Article No. and specify Order code.	
Inspection certificate	C12
to EN 10204-3.1	

Selection and Ordering data	Article No.
Replacement measuring cell for absolute pressure for SITRANS P DS III (from the pressure series)	7MF4992 - 0-0DB0
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	
Measuring cell filling Measuring cell cleaning	
Silicone oil Normal	1
Inert liquid grease-free to cleanliness level 2	3
Measured span (min. ... max.)	
8.3 ... 250 mbar a (0.12 ... 3.62 psia)	D
43 ... 1300 mbar a (0.62 ... 18.85 psia)	F
0.16 ... 5 bar a (2.32 ... 72.5 psia)	G
1 ... 30 bar a (14.5 ... 435 psia)	H
Wetted parts materials	
Seal diaphragm Process connection	
Stainless steel Stainless steel	A
Hastelloy Stainless steel	B
Hastelloy Hastelloy	C
Process connection	
• Connection shank G $\frac{1}{2}$ B to EN 837-1	0
• Female thread $\frac{1}{2}$ -14 NPT	1
• Oval flange made of stainless steel, max. span 160 bar (2320 psi)	
- Mounting thread $\frac{7}{16}$ -20 UNF to IEC 61518	2
- Mounting thread M10 to DIN 19213	3
Further designs	Order code
Please add "-Z" to Article No. and specify Order code.	
Inspection certificate	C12
to EN 10204-3.1	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Accessories/Spare Parts

1

Selection and Ordering data	Article No.
Replacement measuring cell for absolute pressure (from the differential pressure series) for SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus series	7MF4993 - 0DC0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring cell filling	
Silicone oil	1
Inert liquid	3
Measuring cell cleaning	
Normal	
grease-free to cleanliness level 2	
Measured span (min. ... max.)	
8.3 ... 250 mbar a (0.12 ... 3.62 psia)	D
43 ... 1300 mbar a (0.62 ... 18.85 psia)	F
0.16 ... 5 bar a (2.32 ... 72.5 psia)	G
1 ... 30 bar a (14.5 ... 435 psia)	H
5.3 ... 100 bar a (76.9 ... 1450 psia)	KE
Wetted parts materials	
Seal diaphragm	Parts of measuring cell
Stainless steel	A
Hastelloy	B
Hastelloy	C
Tantalum	E
Monel	H
Gold	L
Process connection	
Female thread 1/4-18 NPT with flange connection	
• Sealing screw opposite process connection	
- Mounting thread M10 to DIN 19213	0
- Mounting thread 7/16-20 UNF to IEC 61518	2
• Vent on side of process flange ¹⁾	
- Mounting thread M10 to DIN 19213	4
- Mounting thread 7/16-20 UNF to IEC 61518	6
Non-wetted parts materials	
• Stainless steel process flange screws	2
Further designs	Order code
Please add "-Z" to Article No. and specify Order code.	
O-rings for process flanges (instead of FPM (Viton))	
• PTFE (Teflon)	A20
• FEP (with silicone core, approved for food)	A21
• FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22
• NBR (Buna N)	A23
Inspection certificate	C12
to EN 10204-3.1	
Process connection G½B	D16
Remote seal flanges (not together with K01, K02 and K04)	D20
Vent on side for gas measurements	H02
Process flanges	
• without	K00
• with process flange made of	
- Hastelloy	K01
- Monel	K02
- Stainless steel with PVDF insert max. PN 10 (MAWP 145 psi) max. temperature of medium 90 °C (194 °F) For 1/2-14 NPT inner process connection on the side in the middle of the process flange, vent valve not possible	K04

¹⁾ Not for span 5.3 ... 100 bar (76.9 ... 1450 psi)

Selection and Ordering data	Article No.
Replacement measuring cell for differential pressure and PN 32/160 (MAWP 464/2320 psi) for SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus series	7MF4994 - 0DC0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring cell filling	
Silicone oil	1
Inert liquid	3
Measuring cell cleaning	
Normal	
grease-free to cleanliness level 2	
Measured span (min. ... max.)	
PN 32 (MAWP 464 psi)	
1 ... 20 mbar ¹⁾ (0.4 ... 8 inH ₂ O)	B
PN 160 (MAWP 2320 psi)	
1 ... 60 mbar (0.4 ... 24 inH ₂ O)	C
2.5 ... 250 mbar (1 ... 100 inH ₂ O)	D
6 ... 600 mbar (2.4 ... 240 inH ₂ O)	E
16 ... 1600 mbar (6.4 ... 642 inH ₂ O)	F
50 ... 5000 mbar (20 ... 2000 inH ₂ O)	G
0.3 ... 30 bar (4.35 ... 435 psi)	H
Wetted parts materials (stainless steel process flanges)	
Seal diaphragm	Parts of measuring cell
Stainless steel	A
Hastelloy	B
Hastelloy	C
Tantalum ²⁾	E
Monel ²⁾	H
Gold ²⁾	L
Process connection	
Female thread 1/4-18 NPT with flange connection	
• Sealing screw opposite process connection	
- Mounting thread M10 to DIN 19213	0
- Mounting thread 7/16-20 UNF to IEC 61518	2
• Vent on side of process flange	
- Mounting thread M10 to DIN 19213	4
- Mounting thread 7/16-20 UNF to IEC 61518	6
Non-wetted parts materials	
Stainless steel process flange screws	2
Further designs	Order code
Please add "-Z" to Article No. and specify Order code.	
O-rings for process flanges (instead of FPM (Viton))	
• PTFE (Teflon)	A20
• FEP (with silicone core, approved for food)	A21
• FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22
• NBR (Buna N)	A23
Inspection certificate	C12
to EN 10204-3.1	
Remote seal flanges (not together with K01, K02 and K04)	D20
Vent on side for gas measurements	H02
Stainless steel process flanges for vertical differential pressure lines (not together with K01, K02 and K04)	H03
Process flanges	
• without	K00
• with process flange made of	
- Hastelloy	K01
- Monel	K02
- Stainless steel with PVDF insert, max. PN 10 (MAWP 145 psi), max. temperature of medium 90 °C (194 °F). For 1/2-14 NPT inner process connection on the side in the middle of the process flange, vent valve not possible	K04

¹⁾ Not suitable for connection of remote seal

²⁾ Only together with max. spans 250, 1600, 5000 and 30000 mbar (100 inH₂O, 642 inH₂O, 2000 inH₂O und 435 psi).

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Accessories/Spare Parts

1

Selection and Ordering data		Article No.
Replacement measuring cell for differential pressure and PN 420 (MAWP 6092 psi) for SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus series ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		7MF4995 - 0DC0
Measuring cell filling	Measuring cell cleaning	1
Silicone oil	Normal	
Measured span (min. ... max.)		D E F G H
2.5 ... 250 mbar	(1 ... 100 inH ₂ O)	
6 ... 600 mbar	(2.4 ... 240 inH ₂ O)	
16 ... 1600 mbar	(6.4 ... 642 inH ₂ O)	
50 ... 5000 mbar	(20 ... 2000 inH ₂ O)	
0.3 ... 30 bar	(4.35 ... 435 psi)	
Wetted parts materials (stainless steel process flanges)		A B L
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	
Hastelloy	Stainless steel	
Gold ¹⁾	Gold	
Process connection Female thread 1/4-18 NPT with flange connection		1 3 5 7
<ul style="list-style-type: none"> Sealing screw opposite process connection <ul style="list-style-type: none"> Mounting thread M12 to DIN 19213 Mounting thread 7/16-20 UNF to IEC 61518 Vent on side of process flange <ul style="list-style-type: none"> Mounting thread M12 to DIN 19213 Mounting thread 7/16-20 UNF to IEC 61518 		
Non-wetted parts materials		
<ul style="list-style-type: none"> Stainless steel process flange screws 		
Further designs		
Please add " -Z " to Article No. and specify Order code.		2
O-rings for process flanges (instead of FPM (Viton))		A20 A21 A22 A23
<ul style="list-style-type: none"> PTFE (Teflon) FEP (with silicone core, approved for food) FFPM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F) NBR (Buna N) 		
Inspection certificate to EN 10204-3.1		
Stainless steel process flanges for vertical differential pressure lines		
without process flanges		K00

¹⁾ Not together with max. span 600 mbar (240.9 inH₂O)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Accessories/Spare Parts

1

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Spare parts/Accessories		Mounting screws	
Mounting bracket and fastening parts for pressure transmitters SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF403-.....-..C.) For absolute pressure transmitters SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF423-.....-..C.) • made of steel • made of stainless steel	7MF4997-1AB 7MF4997-1AH	For measuring point label, grounding and connection terminals or for display (50 units)	7MF4997-1CD
Mounting bracket and fastening parts for pressure transmitters SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF403-.....-..A., ..B., ..D. and ..F.) For absolute pressure transmitters SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF423-.....-..A., ..B., ..D. and ..F.) • made of steel • made of stainless steel	7MF4997-1AC 7MF4997-1AJ	Sealing screws (1 set = 2 units) for process flange • made of stainless steel • made of Hastelloy	7MF4997-1CG 7MF4997-1CH
Mounting and fastening brackets For differential pressure transmitters with flange thread M10 SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF433-..... and 7MF443-....) • made of steel • made of stainless steel	7MF4997-1AD 7MF4997-1AK	Sealing screws with vent valve Complete (1 set = 2 units) • made of stainless steel • made of Hastelloy	7MF4997-1CP 7MF4997-1CQ
Mounting and fastening brackets For differential pressure transmitters with flange thread M12 SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF453-....) • made of steel • made of stainless steel	7MF4997-1AE 7MF4997-1AL	Application electronics • for SITRANS P DS III with HART • for SITRANS P DS III with PROFIBUS PA • for SITRANS P DS III with FOUNDATION Fieldbus	7MF4997-1DK 7MF4997-1DL 7MF4997-1DM
Mounting and fastening brackets For differential and absolute pressure transmitters with flange thread 7/16 -20 UNF SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus (7MF433-....., 7MF443-.... and 7MF453-....) • made of steel • made of stainless steel	7MF4997-1AF 7MF4997-1AM	Connection board • for SITRANS P DS III • for SITRANS P DS III PROFIBUS PA and FOUNDATION Fieldbus	7MF4997-1DN 7MF4997-1DP
Cover made of die-cast aluminum, including gasket, for SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus • without window • with window	7MF4997-1BB 7MF4997-1BE	O-rings for process flanges made of: • FPM (Viton) • PTFE (Teflon) • FEP (with silicone core, approved for food) • FFPM (Kalrez, compound 4079) • NBR (Buna N)	7MF4997-2DA 7MF4997-2DB 7MF4997-2DC 7MF4997-2DD 7MF4997-2DE
Cover made of stainless steel, including gasket, for SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus • without window • with window	7MF4997-1BC 7MF4997-1BF 7MF4997-1BR	Sealing ring for process connection	see "Fittings"
Digital indicator Including mounting material for SITRANS P DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus		Weldable sockets for PMC connection • PMC Style Standard: Thread 1½" • PMC Style Minibolt: front-flush 1"	7MF4997-2HA 7MF4997-2HB
Measuring point label • without inscription (5 units) • Printed (1 unit) Data according to Y01 or Y02, Y15, Y16 and Y99 (see "Pressure transmitters")	7MF4997-1CA 7MF4997-1CB-Z Y..:	Gaskets for PMC connection (packing unit = 5 units) • PTFE seal for PMC Style Standard: Thread 1½" • Gasket made of Viton for PMC Style Minibolt: front-flush 1"	7MF4997-2HC 7MF4997-2HD
		Weldable socket for TG52/50 and TG52/150 connection • TG52/50 connection • TG52/150 connection	7MF4997-2HE 7MF4997-2HF
		Seals for TG 52/50 and TG 52/150 made of silicone (FDA compliant)	7MF4997-2HG
		Seals for flange connection with front-flush diaphragm Material FPM (Viton), 10 units • DN 25, PN 40 (M11) • DN 25, PN 100 (M21) • 1", class 150 (M40) • 1", class 300 (M45)	7MF4997-2HH 7MF4997-2HJ 7MF4997-2HK 7MF4997-2HL
		▶ Available ex stock	

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III Accessories/Spare Parts

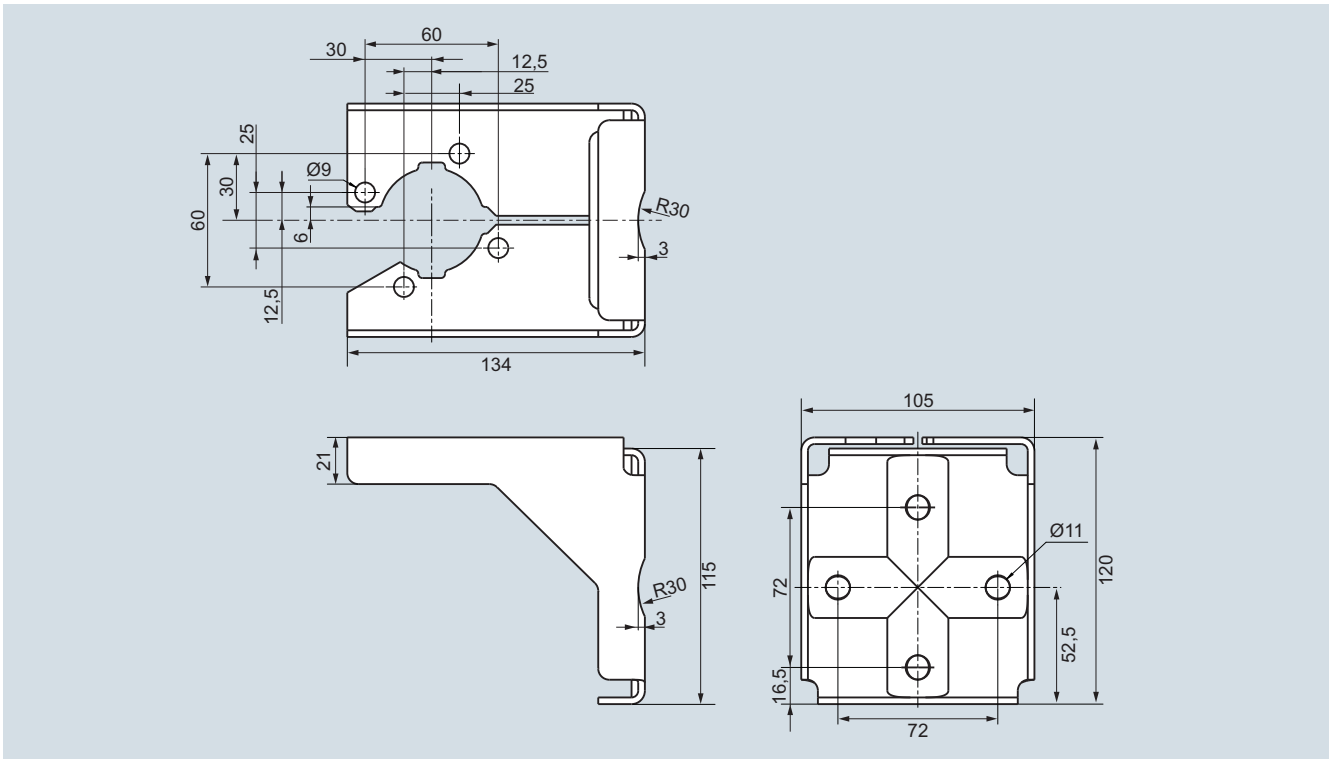
1

Selection and Ordering data	Article No.
Operating Instructions¹⁾	
<ul style="list-style-type: none"> for SITRANS DS III with HART <ul style="list-style-type: none"> - German A5E00047090 - English A5E00047092 - French A5E00053218 - Spanish A5E00053219 - Italian A5E00053220 for SITRANS DS III with PROFIBUS PA <ul style="list-style-type: none"> - German A5E00053275 - English A5E00053276 - French A5E00053277 - Spanish A5E00053278 - Italian A5E00053279 for SITRANS DS III with FOUNDATION Fieldbus <ul style="list-style-type: none"> - German A5E00279629 - English A5E00279627 	
Compact operating instructions	
<ul style="list-style-type: none"> English, german, spanish, french, italian, dutch A5E03434626 English, estonian, latvian, lithuanian, polish, romanian A5E03434631 English, bulgarian, czech, finnish, slovakian, slovenian A5E03434645 English, danish, greek, portuguese, swedish, hungarian A5E03434656 Korean A5E03693760 <p>The compact operating instructions are available in 21 EU languages on the product CD supplied with each transmitter. They can also be downloaded from the SITRANS P web page.</p>	
Brief instruction (Leporello)	
German, English <ul style="list-style-type: none"> for SITRANS DS III with HART A5E00047093 <ul style="list-style-type: none"> - German, English for SITRANS DS III with PROFIBUS PA A5E00053274 <ul style="list-style-type: none"> - German, English for SITRANS DS III with FOUNDATION Fieldbus A5E00282355 <ul style="list-style-type: none"> - German, English 	
CD with SITRANS P documentation	
German, English, French, Spanish, Italian incl. compact operating instructions in 21 EU languages A5E00090345	
Certificates (order only via SAP)	
instead of Internet download <ul style="list-style-type: none"> hard copy (to order) A5E03252406 on CD (to order) A5E03252407 	
Operating Instructions	
for replacement of electronics, measuring cell and connection board (only available from the Internet) ¹⁾ A5E00078060	
HART modem	
with USB interface ▶ 7MF4997-1DB	
Supplementary electronics for 4-wire connection	
▶ Available ex stock	

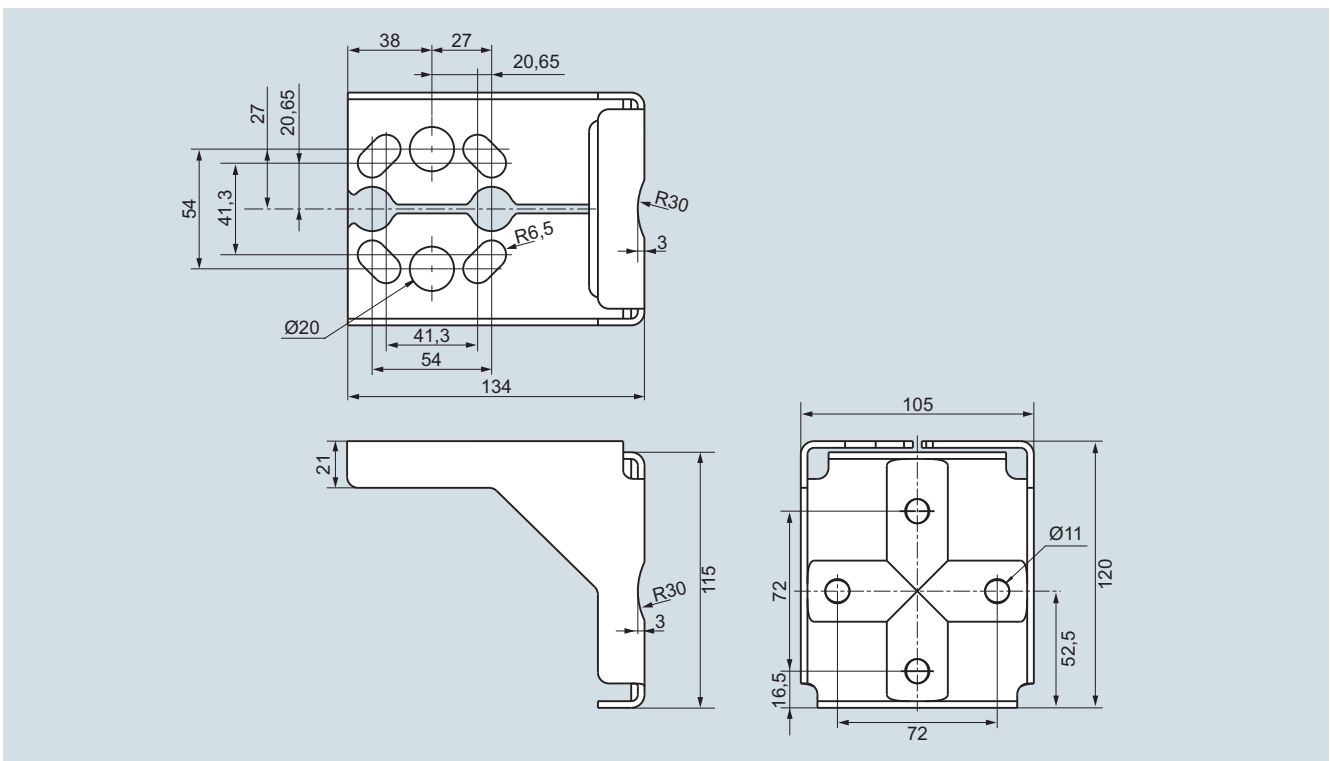
Power supply units see Chap. 7 "Supplementary Components".

¹⁾ You can download these operating instructions free-of-charge from our Internet site at www.siemens.com/sitransp.

Dimensional drawings



Mounting bracket for SITRANS P DS III and SITRANS P280 gauge and absolute pressure-transmitters, dimensions in mm
 mounting bracket material: Sheet-steel Mat. No. 1.0330, chrome-plated, or stainless steel Mat. No. 1.4301 (304)



Mounting bracket for SITRANS P DS III differential pressure transmitter, dimensions in mm
 mounting bracket material: Sheet-steel Mat. No. 1.0330, chrome-plated, or stainless steel Mat. No. 1.4301 (304)

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III - Factory-mounting of valve manifolds on transmitters

Overview

SITRANS P transmitters

- DS III for relative and absolute pressure (both designs) and
- DS III for differential pressure

can be delivered factory-fitted with the following valve manifolds:

- 7MF9011-4EA and 7MF9011-4FA valve manifolds for gauge pressure and absolute pressure transmitters
- 7MF9411-5BA and 7MF9411-5CA valve manifolds for absolute pressure and differential pressure transmitters

Design

The 7MF9011-4EA valve manifolds are sealed with gaskets made of PTFE between transmitter and the valve manifold as standard. Soft iron, stainless steel and copper gaskets are also available for sealing purposes if preferred.

The 7MF9011-4FA valve manifolds are sealed with PTFE sealing tape between the transmitter and the valve manifold.

The 7MF9411-5BA and 7MF9411-5CA valve manifolds are sealed with PTFE sealing rings between the transmitter and the valve manifold.

Once installed, the complete unit is checked under pressure for leaks (compressed air 6 bar (87 psi)) and is certified leak-proof with a test report to EN 10204 - 2.2.

All valve manifolds should preferably be secured with the respective mounting brackets. The transmitters are mounted on the valve manifold and not on the unit itself.

If you order a mounting bracket when choosing the option "Factory mounting of valve manifolds", you will receive a mounting bracket for the valve manifold instead of a bracket for mounting the transmitter.

If you order an acceptance test certificate 3.1 to EN10204 when choosing the option "Factory mounting of valve manifolds", a separate certificate is provided for the transmitters and the valve manifolds respectively.

Selection and Ordering data

7MF9411-5AA valve manifold for relative and absolute pressure transmitters



Add „-Z“ to the Article No. of the transmitter and add order codes.

SITRANS P DSIII
7MF403-...2-..., 7MF423-...2-... ,
7MF403-...3-..., 7MF423-...3-... ,
7MF403-...4-..., 7MF423-...4-...

With process connection oval flange with PTFE gasket and **steel** mounting screws.

Delivery including high-pressure test certified by factory certificate according to EN 10204-2.2

Additional versions:

Delivery includes mounting brackets and mounting clips made of stainless steel (instead of the mounting bracket supplied with the transmitter)

Supplied acceptance test certificate to EN 10204- 3.1 for transmitters and mounted valve manifold

With manufacturer declaration according to NACE, MR-0175

Order code

T05

A02

C12

D07

7MF9411-5AA valve manifold for relative and absolute pressure transmitters



Add „-Z“ to the Article No. of the transmitter and add order codes.

SITRANS P DSIII
7MF403-...2-..., 7MF423-...2-... ,
7MF403-...3-..., 7MF423-...3-... ,
7MF403-...4-..., 7MF423-...4-...

With process connection oval flange with PTFE gasket and **stainless steel** mounting screws.

Delivery including high-pressure test certified by factory certificate according to EN 10204-2.2

Additional versions:

Delivery includes mounting brackets and mounting clips made of stainless steel (instead of the mounting bracket supplied with the transmitter)

Supplied acceptance test certificate to EN 10204- 3.1 for transmitters and mounted valve manifold

With manufacturer declaration according to NACE, MR-0175

Order code

T06

A02

C12

D07

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III - Factory-mounting of valve manifolds on transmitters

1

7MF9011-4FA valve manifold on relative and absolute pressure transmitters



Add -Z to the Article No. of the transmitter and add Order codes	Order code
SITRANS P DSIII 7MF403-...1-..., 7MF423-...1-... With process connection female thread 1/2-14 NPT in-sealed with PTFE sealing tape Delivery incl. high-pressure test certified by test report to EN10204-2.2	T03
Further designs: Delivery includes mounting brackets and mounting clips made of stainless steel (instead of the mounting bracket supplied with the transmitter)	A02
Supplied acceptance test certificate to EN 10204- 3.1 for transmitters and mounted valve manifold	C12
With manufacturer declaration according to NACE, MR-0175	D07

7MF9011-4EA valve manifold on relative and absolute pressure transmitters



Add -Z to the Article No. of the transmitter and add Order codes	Order code
SITRANS P DSIII 7MF403-...0-..., 7MF423-...0-... with process connection collar G 1/2 A to EN 837-1 with gasket made of PTFE between valve manifold and transmitter	T02
Alternative sealing material: • Soft iron • Stainless steel, Mat. No. 14571 • copper	A70 A71 A72
Delivery incl. high-pressure test certified by test report to EN 10204-2.2	
Further designs: Delivery includes mounting brackets and mounting clips made of stainless steel (instead of the mounting bracket supplied with the transmitter)	A02
Supplied acceptance test certificate to EN 10204- 3.1 for transmitters and mounted valve manifold	C12
With manufacturer declaration according to NACE, MR-0175	D07

7MF9411-5BA valve manifold on absolute and differential pressure transmitters



Add -Z to the Article No. of the transmitter and add Order codes	Order code
SITRANS P DSIII 7MF433-..., 7MF443-... and 7MF453-... ¹⁾ mounted with gaskets made of PTFE and screws made of • chromized steel • made of stainless steel Delivery incl. high-pressure test certified by test report to EN 10204-2.2	U01 U02
Further designs: Delivery includes mounting bracket and mounting clips made of • Steel • Stainless steel (instead of the mounting bracket supplied with the transmitter)	A01 A02
Supplied acceptance test certificate to EN 10204-3.1 for transmitters and mounted valve manifold	C12
With manufacturer declaration according to NACE, MR-0175	D07

7MF9411-5CA valve manifold on differential pressure transmitters



Add -Z to the Article No. of the transmitter and add Order codes	Order code
SITRANS P DSIII 7MF443-... and 7MF453-... ¹⁾ mounted with gaskets made of PTFE and screws made of • chromized steel • Stainless steel Delivery incl. high-pressure test certified by test report to EN 10204-2.2	U03 U04
Further designs: Delivery includes mounting bracket and mounting clips made of • Steel • Stainless steel (instead of the mounting bracket supplied with the transmitter)	A01 A02
Supplied acceptance test certificate to EN 10204-3.1 for transmitters and mounted valve manifold	C12
With manufacturer declaration according to NACE, MR-0175	D07

¹⁾ For 7MF453-... transmitters, you require a 7/10-20 UNF connection thread in the process flange

Pressure Measurement

Transmitters for general requirements

SITRANS P DS III - Factory-mounting of valve manifolds on transmitters

1

Dimensional drawings

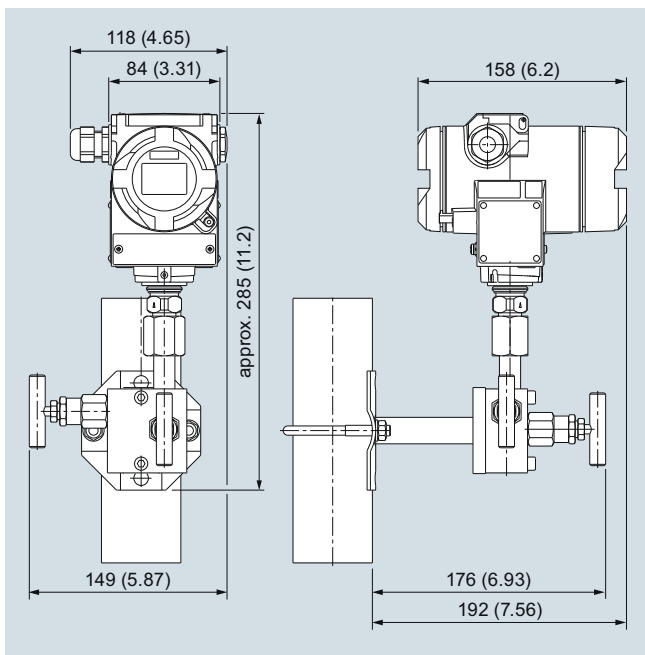
Valve manifolds mounted on SITRANS P DS III



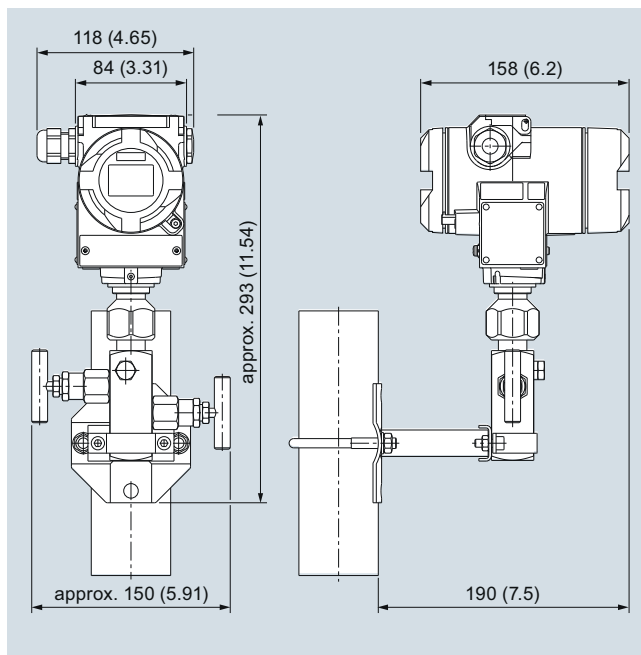
7MF9011-4EA valve manifold with mounted gauge pressure and absolute pressure transmitters



7MF9011-4FA valve manifold with mounted gauge pressure and absolute pressure transmitters



7MF9011-4EA valve manifold with mounted gauge pressure and absolute pressure transmitters, dimensions in mm (inch)



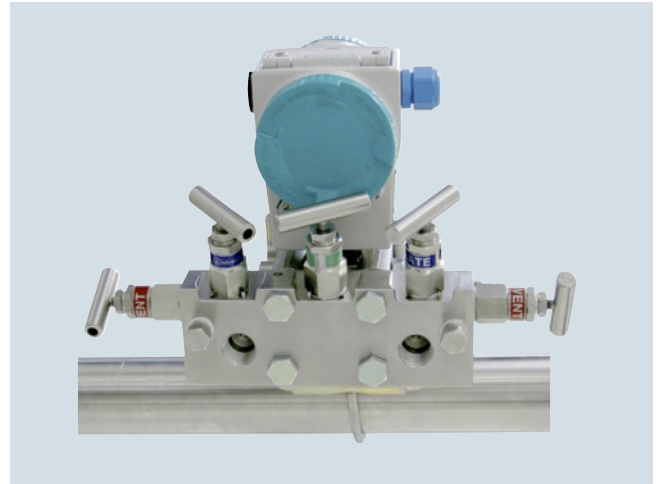
7MF9011-4FA valve manifold with mounted gauge pressure and absolute pressure transmitters, dimensions in mm (inch)

Pressure Measurement Transmitters for general requirements

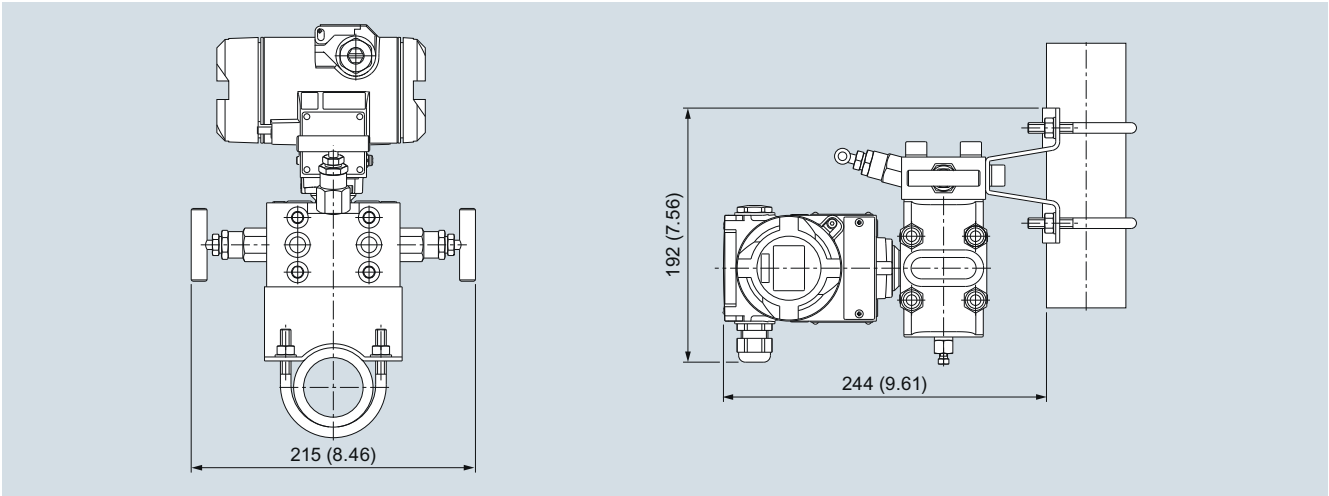
SITRANS P DS III - Factory-mounting of valve manifolds on transmitters



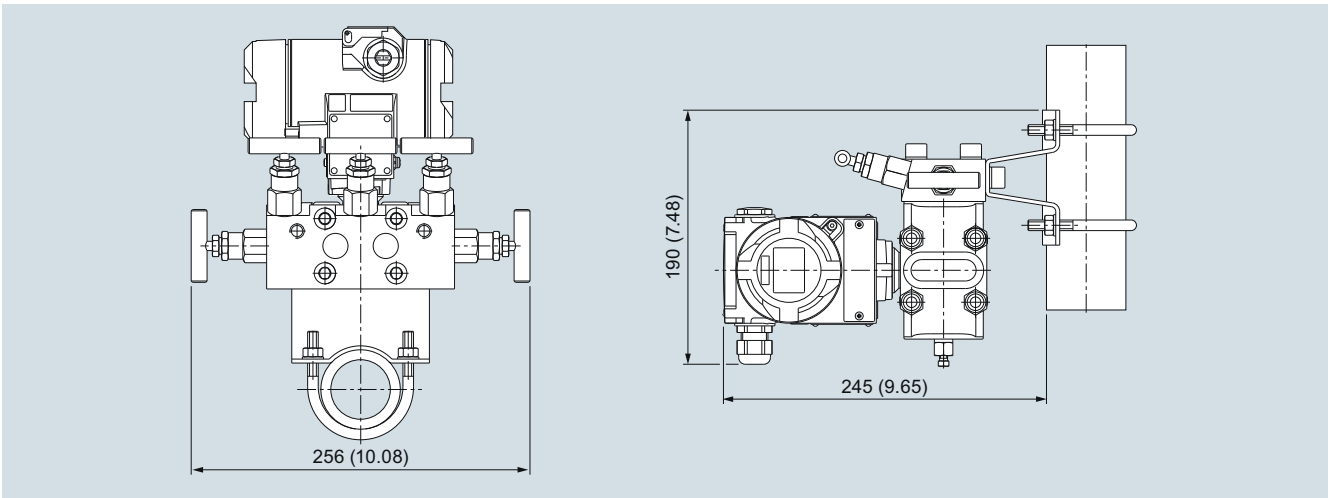
7MF9411-5BA valve manifold with mounted differential pressure transmitter



7MF9411-5CA valve manifold with mounted differential pressure transmitter



7MF9411-5BA valve manifold with mounted differential pressure transmitter, dimensions in mm (inch)



7MF9411-5CA valve manifold with mounted differential pressure transmitter, dimensions in mm (inch)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 - Technical description

Overview



SITRANS P500 pressure transmitters are digital pressure transmitters featuring extensive user-friendliness and which fulfil the most stringent demands of accuracy, long-term stability, speed and lots more.

Extensive functionality allows you to set the pressure transmitter specifically to your own requirements. Despite their many settings options, local set-up is easy. A multi-lingual menu with clear text instructions guides you through the process. There are also help texts available.

The innovative EDD with integrated QuickStart assistance is also quick and easy to configure by computer using the HART protocol.

Extensive diagnostic functions, e.g. min/max pointer for pressure and temperature, or limit value indicator, make sure you always have the process under control. You can also display additional process values such as temperature or static pressure. The simultaneous display of mass, resulting from a volume, is also easy.

The SITRANS P500 pressure transmitters can be configured to measure:

- Differential pressure
- Level
- Volume
- Mass
- Volume flow
- Mass flow

Benefits

- High measuring accuracy
- Very fast response time
- Extremely good long-term stability
- High reliability even under extreme chemical and mechanical loads
- For aggressive and non-aggressive gases, vapors and liquids
- Extensive diagnosis and simulation functions which can be used both on site as well as via HART.
- Optional separate replacement of measuring cell and electronics without recalibration.
- Extremely low conformity error values

- Infinitely adjustable spans of 1.25 mbar to 32 bar (0.018 to 465 psi; 0.5 to 12860 inH₂O)
- Extremely good total performance and conformity error values with no loss of performance up to a turndown of 10 guaranteed.
- Additional integrated sensor for static pressure
- Parameterization via on-site control keys or HART
- Short process flanges nable space-saving installation.

Application

The SITRANS P500 pressure transmitters can be used in industrial areas with extreme chemical and mechanical loads. Electromagnetic compatibility in the range 10 kHz to 1 GHz makes them suitable for locations with high electromagnetic emissions.

Pressure transmitters with ratings "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The pressure transmitter comes with a CE-declaration of conformity and fulfils the corresponding unified European directives (ATEX).

Pressure transmitters with the type of protection "Intrinsic safety" for use in zone 0 may be operated with power supply units of category "ia" and "ib".

With newly designed measuring cell, it is possible to work with process temperatures of -40 to 125 °C (-40 to +257 °F) without having to use a remote seal.

The transmitters can be equipped with various designs of remote seals for special applications such as the measurement of highly viscous fluids.

The pressure transmitter can be fully parameterized locally via the three operating keys and externally via HART.

Pressure transmitters for differential pressure and flow

- Measured variables:
 - Differential pressure
 - Small positive or negative pressure
 - Flow $q \sim \sqrt{\Delta p}$ (together with a primary element (see Chapter "Flow Meters"))
- Span (freely adjustable)
for SITRANS P500: 1.25 mbar to 32 bar (0.018 to 465 psi; 0.5 to 12860 inH₂O)

Pressure transmitters for level

- Measured variable: Level of aggressive and non-aggressive liquids in open and closed vessels.
- Span (freely adjustable)
for SITRANS P500: 1.25 to 6250 mbar (0.5 to 2509 inH₂O)

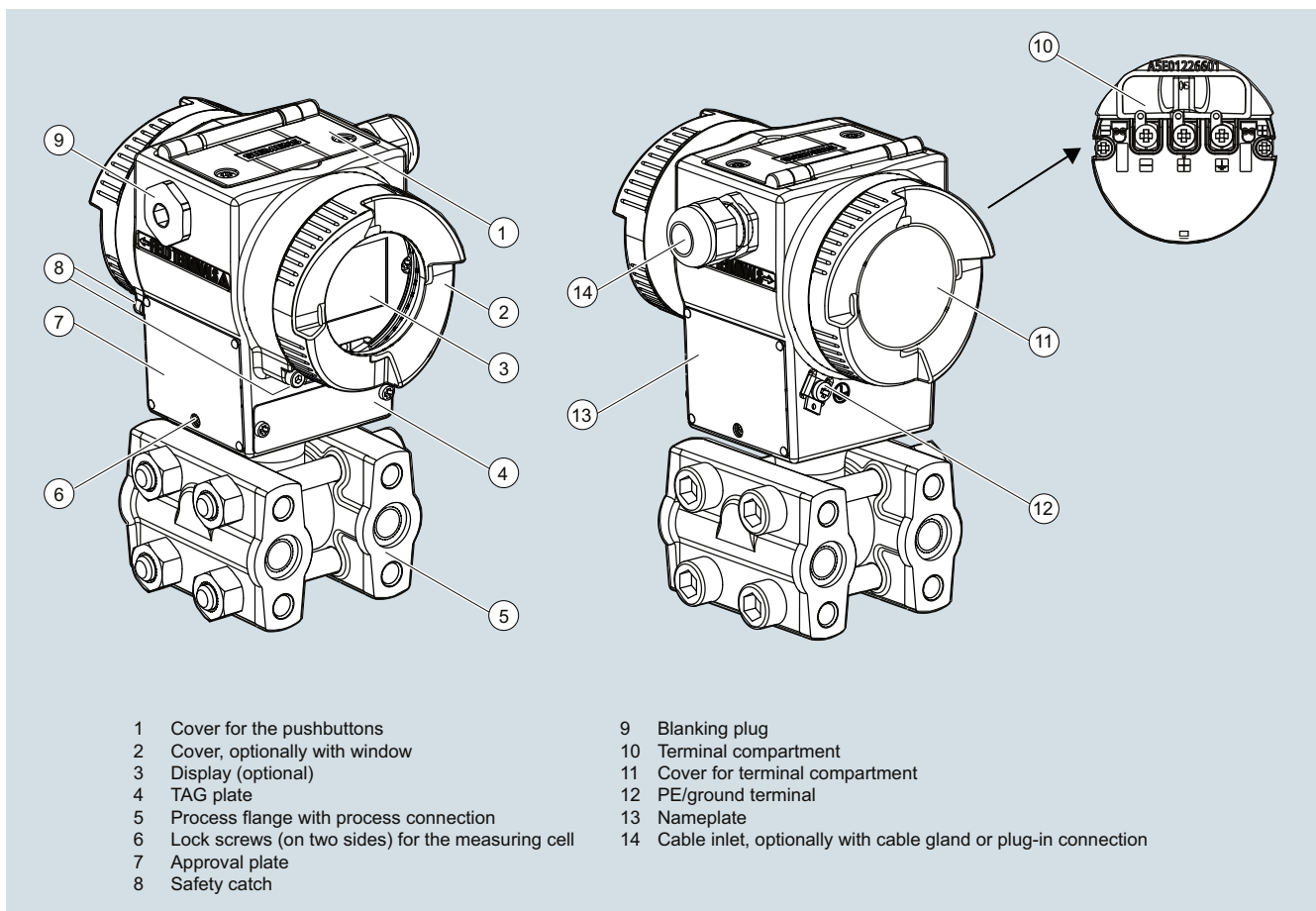
- Nominal diameter of the mounting flange
 - DN 50 / PN 40
 - DN 80 / PN 40
 - DN 100/ PN 16, PN 40
 - 2 inch/class 150, class 300
 - 3 inch/class 150, class 300
 - 4 inch/ class 150, class 300
 - customized special version

In the case of level measurements in open vessels, the low-pressure connection of the measuring cell remains open (measurement "compared to atmospheric").

In the case of measurements in closed vessels, the lower-pressure connection has to be connected to the vessel in order to compensate the static pressure.

The wetted parts are made from a variety of materials, depending on the degree of corrosion resistance required.

Design



View of transmitter

- The electronics housing is made of coated die-cast aluminum.
- The casing has round screwed covers front and back.
- Depending on the design the front cover is fitted with an inspection window. You can read off the measured value directly from the optional display through the window.
- The inlet to the terminal compartment is located either on the left or right side. The unused opening in each case is sealed by a blanking plug.
- The PE/ground terminal is on the back of the housing.
- Access to the terminal compartment for auxiliary power and shielding by unscrewing the cover.
- Beneath the electronic housing is the measuring cell with its process flanges at which the process connections are available. The modular design of the pressure transmitter lets you replace the measuring cell, electronics and connection board as required.
- On the top of the housing you can see the screwed cover of the three local pushbuttons of the transmitter.

Pressure Measurement

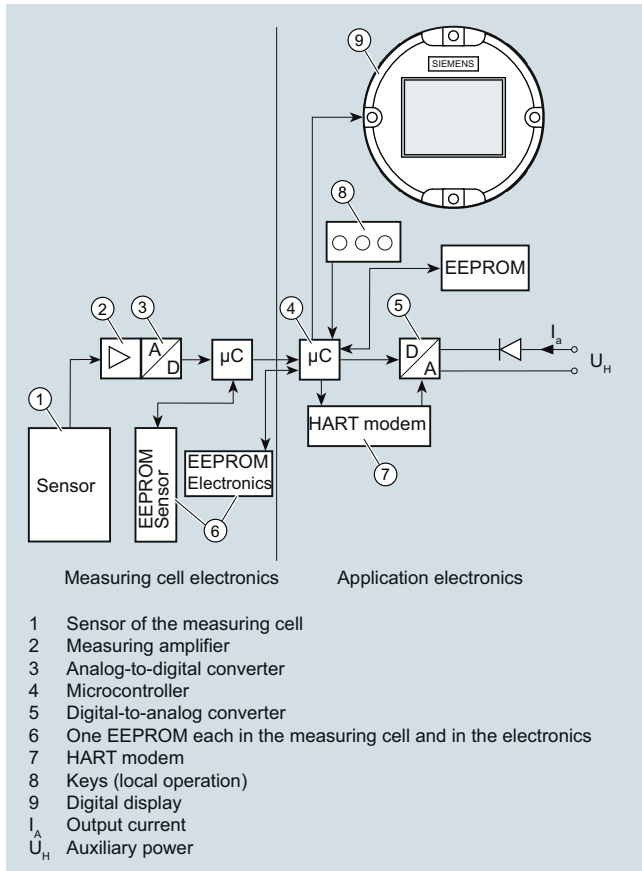
Transmitters for High Performance requirements

SITRANS P500 - Technical description

1

Function

Operation of electronics with HART communication



Function diagram of electronics

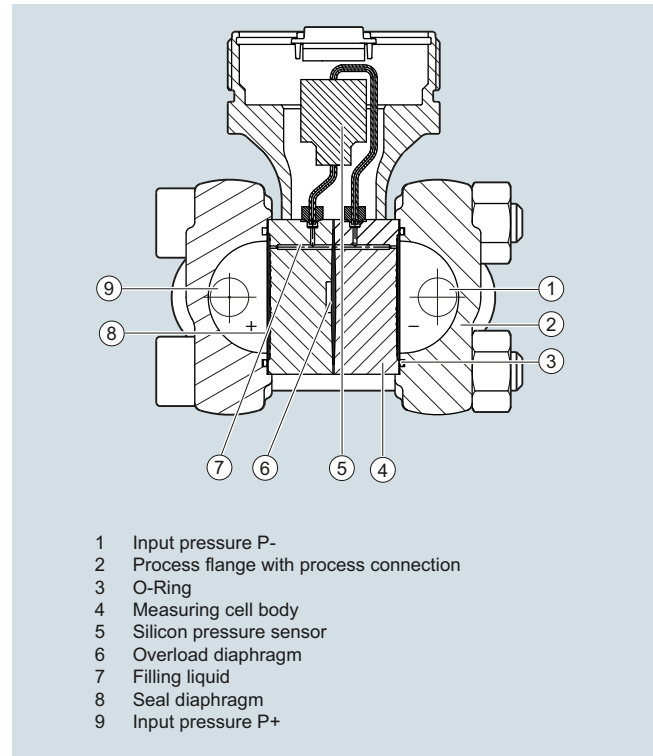
- The input pressure is converted into an electrical signal by the sensor.
- This signal is amplified by the measuring amplifier and digitalized in an analog-to-digital converter.
- The digital signal is analyzed in a microcontroller and corrected according to linearity and thermal characteristics.
- In a digital-to-analog converter it is then converted into the output current of 4 to 20 mA. When connected to supply lines, a diode circuit provides reverse polarity protection.
- The measuring cell-specific data, the electronic data and the parameterization data is held in two EEPROMs. One EEPROM is incorporated into the measuring cell electronics, the other is incorporated into the application electronics.

Operation

- The three local pushbuttons enable you both to navigate and carry out configuration and to visually track messages and process values, provided a display is available.
- If you have a device without a display, you can carry out zero adjustment using the three local pushbuttons. It is possible to retrofit a display at any time.
- You can also carry out settings by computer via a HART modem.

Mode of operation of the measuring cells

Measuring cell for differential pressure and flow



Measuring cell for differential pressure and flow, function diagram

- The differential pressure is transmitted via the seal diaphragm and the filling liquid to the silicon pressure sensor.
- If the measuring limits are exceeded, the overload diaphragm flexes until the seal diaphragm touches the body of the measuring cell. This protects the sensor module from overload.
- The differential pressure causes the measuring diaphragm of the silicon pressure sensor to flex.
- The displacement changes the resistance value of the 4 piezo resistors in the measuring diaphragm in a bridge circuit.
- The change in the resistance causes a bridge output voltage proportional to the input pressure.

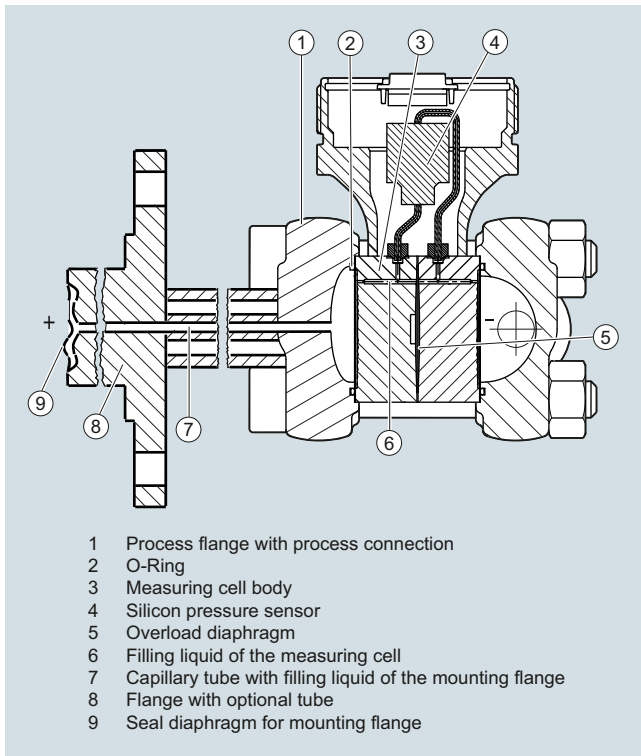
Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 - Technical description

1

Measuring cell for level



- 1 Process flange with process connection
- 2 O-Ring
- 3 Measuring cell body
- 4 Silicon pressure sensor
- 5 Overload diaphragm
- 6 Filling liquid of the measuring cell
- 7 Capillary tube with filling liquid of the mounting flange
- 8 Flange with optional tube
- 9 Seal diaphragm for mounting flange

Measuring cell for level, function diagram

- The input pressure (hydrostatic pressure) acts hydraulically on the measuring cell via the seal diaphragm on the mounting flange.
- The differential pressure applied to the measuring cell is transmitted via the seal diaphragm and the filling liquid to the silicon pressure sensor.
- If the measuring limits are exceeded, the overload diaphragm flexes until the seal diaphragm touches the body of the measuring cell. This protects the sensor module from overload.
- The differential pressure causes the measuring diaphragm of the silicon pressure sensor to flex.
- The displacement changes the resistance value of the 4 piezo resistors in the measuring diaphragm in a bridge circuit.
- The change in the resistance causes a differential pressure proportional to the input pressure.

Configuration of SITRANS P500 HART

Depending on the version, there are a range of options for configuring the pressure transmitter and for setting or reading the parameters.

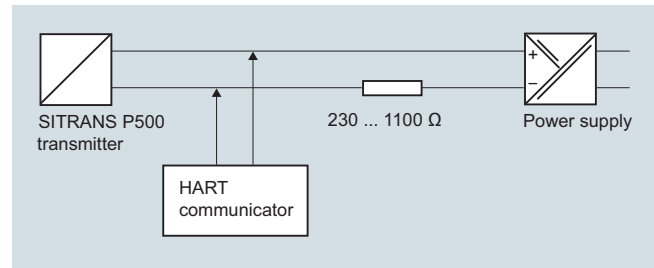
Configuration using the pushbuttons (local operation)

You can configure the transmitter in situ using the three keys provided a display is available. If you have no display, you can only carry out zero adjustment.

It is possible to retrofit a display. See accessories.

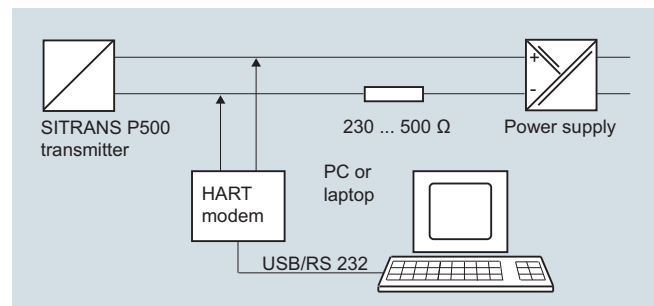
Configuration using HART

Parameterization using HART is carried out using a HART Communicator or a PC in conjunction with a HART modem.



Communication between a HART Communicator and a pressure transmitter

When parameterizing with the HART Communicator, the connection is made directly to the 2-wire cable.



HART communication between a PC communicator and a pressure transmitter

For configuring via PC a HART modem is used which connects the transmitter to the PC.

The signals needed for communication in conformity with the HART 6.0 protocols are superimposed on the output current using the Frequency Shift Keying (FSK) method.

The necessary device files are available for download on the Internet.

SITRANS P500 configuration options

The transmission offers you full configuring options both via HART as well as in situ provided the optional display is available.

For simple parameterizing we also offer the easy to understand QuickStart function with guided commissioning.

SITRANS P500 diagnostic functions

- Maintenance timer
- Min/Max pointer (both resetable and non-resetable)
 - Pressure (incl. time and temperature stamp)
 - Static pressure (incl. time and temperature stamp)
 - Sensor temperature (incl. time stamp)
 - Electronic temperature (incl. time stamp)
- Limit monitor block
- Diagnostic warning
- Diagnostic alarm
- Simulation functions
- Display of trends and histograms
- Operating hours meter

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 - Technical description

Physical dimensions available for the SITRANS P500 HART display

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	Pa, MPa, kPa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , mmH ₂ O (4 °C), inH ₂ O (4 °C), inH ₂ O (20 °C), mmH ₂ O, mmH ₂ O (4 °C), ftH ₂ O (20 °C), inHg, mmHg, hPA
Level	m, cm, mm, ft, in
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , gallon, Imp. gallon, bushel, barrel, barrel liquid, l; Norm (standard) l; Norm (standard) m ³ , Norm (standard) feet ³
Mass	g, kg, t (metric), lb, Ston, Lton, oz
Volume flow	m ³ /d, m ³ /h, m ³ /s, l/min, l/s, ft ³ /d, ft ³ /min, ft ³ /s, US gallon/min, gallon/s, l/h, milL/d, gallon/d, gallon/h, milgallon/d, Imp.gallon/s, Imp.gallon/m, Imp.gallon/h, Imp.gallon/d, Norm (standard) m ³ /h, Norm (standard) l/h, Norm (standard) ft ³ /h, Norm (standard) ft ³ /m, barrel liquid/s, barrel liquid/m, barrel liquid/h
Mass flow	t/d, t/h, t/min, kg/d, kg/h, kg/min, kg/s, g/h, g/min, g/s, lb/d, lb/min, lb/s, LTon/d, LTon/h, STon/d, STon/h, STon/min
Temperature	K, °C, °F, °R
Miscellaneous	%, mA

Technical specifications

Input		Measuring accuracy	
Measured variable	Differential pressure and flow	Reference conditions (in accordance with IEC 60770-1)	<ul style="list-style-type: none"> • Rising characteristic curve • Start of scale 0 bar • Stainless steel seal diaphragm • Measuring cell with silicone oil filling • Room temperature (25 °C (77 °F))
Span (infinitely adjustable)	Span (min. ... max.)	All error information always refers to the set span.	
	Maximum operating pressure (static pressure)	Error in measurement at limit setting incl. hysteresis and reproducibility	
		r: Span ratio (r: Span ratio (r = max. span / set span))	
	1.25 ... 250 mbar (0.5 ... 100 inH ₂ O)	Linear characteristic	r ≤ 10
	6.25 ... 1250 mbar (2.5 ... 502 inH ₂ O)	<ul style="list-style-type: none"> • 250 mbar (100 inH₂O) • 1250 mbar (502 inH₂O) • 6250 mbar (2509 inH₂O) • 32 bar (465 psi) 	≤ 0.03 %
	31.25 ... 6250 mbar (12.54 ... 2509 inH ₂ O)		r ≥ 10
	0.16 ... 32 bar (2.33 ... 465 psi)	Square-rooted characteristic	r ≤ 10
Lower range limit		<ul style="list-style-type: none"> • Flow > 50 % - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O) - 32 bar (465 psi) 	≤ 0.03 %
• Measuring cell with silicone oil filling	-100 % of max. span and/or 30 mbar a (0.44 psia)		r ≥ 10
Upper range limit	100 % of max. span	<ul style="list-style-type: none"> • Flow 25 % ... 50 % - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O) - 32 bar (465 psi) 	≤ 0.06 %
Start of scale	Between measuring limits (freely adjustable)		r ≥ 10
Output		Influence of ambient temperature per 28 °C (50 °F)	
Output current signal	4 ... 20 mA	<ul style="list-style-type: none"> • 250 mbar (100 inH₂O) • 1250 mbar (502 inH₂O) • 6250 mbar (2509 inH₂O) • 32 bar (465 psi) 	≤ (0.025 · r + 0.014) %
• Lower current limit (freely adjustable)	3.55 mA, factory setting 3.8 mA		≤ (0.006 · r + 0.03) %
• Upper current limit (freely adjustable)	23 mA, factory setting 20.5 mA	Influence of static pressure	
• Ripple (without HART communication)	I _{pp} ≤ 0.4 % of max. output current	• At the start of scale value (PKN)	
• adjustable damping	0... 100 s in steps of 0.1 s, factory-setting: 2 s	- 250 mbar (100 inH ₂ O)	≤ (0.035 · r) % per 70 bar (1015 psi) correction via zero point correction
• current transmitter	3.55 ... 23 mA	- 1250 mbar (502 inH ₂ O)	≤ (0.007 · r) % per 70 bar (1015 psi) correction via zero point correction
• Failure signal	adjustable within limits::	- 6250 mbar (2509 inH ₂ O)	
	• Bottom: 3.55 ... 3.7 mA (default value: 3.6 mA)	- 32 bar (465 psi)	
	• Top: 21.0 ... 23 mA (default value: 22.8 mA)	• On the span (PKS)	
Load		- 250 mbar (100 inH ₂ O)	≤ 0.03 % per 70 bar (1015 psi)
• Without HART communication	R _B ≤ (U _H - 10.5 V)/0.023 A in Ω, U _H : Power supply in V	- 1250 mbar (502 inH ₂ O)	≤ 0.09 % per 70 bar (1015 psi)
• With HART communication		- 6250 mbar (2509 inH ₂ O)	≤ 0.05 % per 70 bar (1015 psi)
- HART Communicator	R _B = 230 ... 1100 Ω	- 32 bar (465 psi)	
- HART modem	R _B = 230 ... 500 Ω		
Characteristic curve	Linearly rising, linearly falling, square rooted characteristic rising, bidirectional square rooted characteristic and user-specific		

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

Total Performance ¹⁾		
<ul style="list-style-type: none"> Linear characteristic - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O) 32 bar (465 psi) 	$r \leq 5$	$5 < r \leq 10$
	$\leq 0.14 \%$	$\leq 0.27 \%$
<ul style="list-style-type: none"> Square rooted characteristic Flow > 50 % - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O) 32 bar (465 psi) 	$r \leq 5$	$5 < r \leq 10$
	$\leq 0.14 \%$	$\leq 0.27 \%$
<ul style="list-style-type: none"> Flow 25 % ... 50 % - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O) 32 bar (465 psi) 	$r \leq 5$	$5 < r \leq 10$
	$\leq 0.28 \%$	$\leq 0.54 \%$
<ul style="list-style-type: none"> Step response time T_{63} without electrical damping • 250 mbar (100 inH₂O) 1250 mbar (502 inH₂O) 6250 mbar (2509 inH₂O) 32 bar (465 psi) 	≤ 88 ms, contains a dead time of ≤ 45 ms	
	$\leq (0.05 \cdot r) \%$ per 5 years	$\leq (0.08 \cdot r) \%$ per 10 years
Long-term stability	$\leq (0.05 \cdot r) \%$ per 5 years	$\leq (0.08 \cdot r) \%$ per 10 years
Influence of power supply	$\leq 0.005 \%$ /1 V	
Rated conditions		
Mounting position	Any	
Ambient conditions		
<ul style="list-style-type: none"> Ambient temperature (Note: Observe the temperature class in areas subject to explosion hazard.) - Total device - Readable display - Storage temperature 	-40 ... +85 °C (-40 ... +185 °F)	-20 ... +85 °C (-4 ... +185 °F)
- Storage temperature	-50 ... +90 °C (-58 ... +194 °F)	
Climatic class		
<ul style="list-style-type: none"> Condensation 	Relative humidity 0 ... 100 % (condensation permissible)	
Degree of protection (to IEC 60529)	IP66/IP 68 and NEMA 4X (with corresponding cable gland)	
Electromagnetic Compatibility		
<ul style="list-style-type: none"> Emitted interference and interference immunity 	Acc. to IEC 61326 and NAMUR NE 21	
Permissible pressures	According to 97/23/EC pressure equipment directive	
Temperature of medium		
<ul style="list-style-type: none"> Measuring cell with silicone oil filling 	-40 ... +125 °C (-40 ... +257 °F)	

Design

Weight (without options)	Approx. 3.3 kg (7.3 lb)
Material of parts in contact with the medium	Stainless steel, mat. no. 1.4404/316L, Hastelloy C276, Monel 400
<ul style="list-style-type: none"> Seal diaphragm 	Stainless steel, mat. no. 1.4404/316L, Hastelloy C276, Monel 400
<ul style="list-style-type: none"> Process connection and sealing screw 	PN 160: stainless steel, mat.-No. 1.4404/316L
<ul style="list-style-type: none"> Sealing material in the process connections - O-Ring 	<ul style="list-style-type: none"> Standard: Viton (FKM (FPM)) Optional: NBR, PTFE (virginal), PTFE (glass fiber-reinforced), FFKM (Kalrez)²⁾²⁾, Graphite
Material of parts not in contact with media	
Electronics housing	<ul style="list-style-type: none"> Low copper die-cast aluminum AC-AISI12 (Fe) or AC-AISI 10 Mg (Fe) to DIN EN 1706 Lacquer on polyurethane base, optional epoxy-based primer Stainless steel name plates (mat. no. 1.4404/316L)
Process connection screws	Stainless steel, mat. no. 1.4404/316L
Mounting bracket	Steel or stainless steel mat. no. 1.4301
Measuring cell filling	Silicone oil
Process connection	1/4-18 NPT female thread and flange connection with M10 to DIN 19213 or 7/16-20 UNF mounting thread to IEC 61518
Electrical connection	<ul style="list-style-type: none"> Screw terminals Cable entry via the following screwed glands: <ul style="list-style-type: none"> - M20 x 1.5 - 1/2-14 NPT - Han 7D/Han 8D connector - M12 plug
Displays and controls	
Pushbuttons	3 for local programming directly on transmitter
Display	<ul style="list-style-type: none"> With or without integrated display Cover with or without window
Auxiliary power supply	
Terminal voltage on transmitter	<ul style="list-style-type: none"> DC 10.6 ... 44 V With intrinsically-safe operation DC 10.6 ... 30 V

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

1

Certificates and approvals

Classification according to PED 97/23/EC

- PN 160 (MAWP 2320 psi) For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)

Explosion protection

Explosion protection for Europe (to ATEX)

- Intrinsic safety "i"
 - Marking PTB 09 ATEX 2004 X
 - Permissible ambient temperature Ex II 1/2 G Ex ia/ib IIC T4
 - Connection -40 ... +85 °C (-40 ... +185 °F)
 - Effective internal inductance: To certified intrinsically-safe circuits with peak values:
 $U_i = 30\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 750\text{ mW}$; $R_i = 300\ \Omega$
 - Effective inner capacitance: $L_i = 400\ \mu\text{H}$
- Explosion-proof "d"
 - Marking BVS 09 ATEX E 027
 - Permissible ambient temperature Ex II 1/2 G Ex d IIC T4/T6
 - Connection -40 ... +85 °C (-40 ... +185 °F)
 - Effective internal inductance: -40 ... +60 °C (-40 ... +140 °F) temperature class T6
 - Effective inner capacitance: To circuits with values:
 $U_m = \text{DC } 10.5 \dots 45\text{ V}$
- Dust explosion protection for zone 20
 - Marking PTB 09 ATEX 2004 X
 - Permissible ambient temperature Ex II 1 D Ex iaD 20 T 120 °C
 - Max. surface temperature -40 ... +85 °C (-40 ... +185 °F)
 - Connection 120 °C (248 °F)
 - Effective internal inductance: To certified intrinsically-safe circuits with peak values:
 $U_i = 30\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 750\text{ mW}$, $R_i = 300\ \Omega$
 - Effective inner capacitance: $L_i = 400\ \mu\text{H}$
- Dust explosion protection for zone 21/22
 - Marking BVS 09 ATEX E 027
 - Connection Ex II 2 D Ex tD A21 IP68 T120 °C Ex ia D21
 - Effective internal inductance: To circuits with values:
 $U_m = 10.5 \dots 45\text{ V DC}$; $P_{\text{max}} = 1.2\text{ W}$
- Type of protection "n" (zone 2)
 - Marking PTB 09 ATEX 2004 X
 - "nA" connection Ex II 3 G Ex nA II T4/T6
 - "nL, ic" connection Ex II 2/3 G Ex ib/nL IIC T4/T6
 - Effective internal inductance: Ex II 2/3 G Ex ib/ic IIC T4/T6
 - Effective inner capacitance: $U_m = 45\text{ V DC}$
 - "nL, ic" connection $U_i = 45\text{ V}$
 - Effective internal inductance: $L_i = 400\ \mu\text{H}$
 - Effective inner capacitance: $C_i = 6\text{ nF}$

Explosion protection for USA

(to FM)

Certificate of Compliance

No. 3033013

- Identification (XP/DIP) or (IS)
 - XP CL I, DIV 1, GP ABCDEFG T4 / T6
 - DIP CL II, III, DIV1, GP EFG T4/T6
 - IS CL I, II, III, DIV1, GP ABCDEFG T4
 - CL I, Zone 0, AEx ia IIC T4
 - CL I, Zone 1, AEx ib IIC T4
- Permissible Ambient Temperature
 - $T_a = \text{T4: } -40 \dots +85\text{ °C}$
(-40 ... +185 °F)
 - $T_a = \text{T6: } -40 \dots +60\text{ °C}$
(-40 ... +140 °F)
- Entity parameters
 - According to "control drawing": A5E02189134N
 - $U_m = 30\text{ V}$, $I_m = 100\text{ mA}$, $P_i = 750\text{ mW}$, $L_i = 400\ \mu\text{H}$, $C_i = 6\text{ nF}$
- Marking (NI/NO)
 - NI CL I, DIV 2, GP ABCD T4/T6
 - NI CL I, Zone 2, GP IIC T4/T6
 - S CL II, III, GPFG T4/T6
 - NI CL I, DIV 2, GP ABCD T4/T6, NIFW
 - NI CL I, Zone 2, GP IIC T4/T6, NIFW
 - NI CLII, III, DIV 2, GP FG T4/T6, NIFW
- Permissible Ambient Temperature
 - $T_a = \text{T4: } -40 \dots +85\text{ °C}$
(-40 ... +185 °F)
 - $T_a = \text{T6: } -40 \dots +60\text{ °C}$
(-40 ... +140 °F)
- (NI/S) parameters
 - According to "control drawing": A5E02189134N
 - $U_m = 45\text{ V}$, $L_i = 400\ \mu\text{H}$, $C_i = 6\text{ nF}$

Explosion protection for Canada (to cCSAUS)

Certificate of Compliance

No. 2280963

- Marking (XP/DIP)
 - CL I, DIV 1, GP ABCD T4 /T6;
 - CL II, DIV 1, GP EFG T4/T6
- Permissible ambient temperature
 - $T_a = \text{T4: } -40 \dots +85\text{ °C}$ (-40 ... +185 °F)
 - $T_a = \text{T6: } -40 \dots +60\text{ °C}$ (-40 ... +140 °F)
- Entity parameters
 - According to "control drawing": A5E02189134N
 - $U_m = 45\text{ V}$
- Marking (ia/ib)
 - CL I, Ex ia/Ex ib IIC, T4
 - CL II, III, Ex ia/Ex ib, GP EFG, T4
 - CL I, AEx ia/AEx ib IIC, T4
 - CL II, III, AEx ia/ AEx ib, GP EFG, T4
- Permissible ambient temperature
 - $T_a = \text{T4: } -40 \dots +85\text{ °C}$
(-40 ... +185 °F)
- Entity parameters
 - $U_i = 30\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 750\text{ mW}$, $R_i = 300\ \Omega$, $L_i = 400\ \mu\text{H}$, $C_i = 6\text{ nF}$
- Marking (NI/n)
 - CL I, DIV 2, GP ABCD T4/T6
 - CL II, III, DIV 2, GP FG T4/T6
 - Ex nA IIC T4/T6
 - AEx nA IIC T4/T6
 - Ex nL IIC T4/T6
 - AEx nL IIC T4/T6
- Permissible ambient temperature
 - $T_a = \text{T4: } -40 \dots +85\text{ °C}$ (-40 ... +185 °F)
 - $T_a = \text{T6: } -40 \dots +60\text{ °C}$ (-40 ... +140 °F)
- NI/nA parameters
 - According to "control drawing": A5E02189134N
 - $U_m = 45\text{ V}$
- nL parameters
 - According to "control drawing": A5E02189134N
 - $U_i = 45\text{ V}$, $I_i = 100\text{ mA}$, $L_i = 400\ \mu\text{H}$, $C_i = 6\text{ nF}$

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

Explosion protection for China (acc. to NEPSI)

• Intrinsic safety "i"	GYJ111111X
- Marking	Ex ia/ib IIB/IIC T4
- Perm. ambient temperature	40 ... +85 °C (-40 ... +185 °F)
- Connection	To certified intrinsically-safe circuits with maximum values: $U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$
- Effective internal inductance	$L_i = 400 \text{ mH}$
- Effective inner capacitance	$C_i = 6 \text{ nF}$
• Explosion-proof "d"	GYJ111112
- Marking	Ex dia IIC T4/T6
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
• Dust explosion protection for zone 21/22	GYJ111112
- Marking	DIP A21 TA, T120 °C IP68 D21
- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
• Type of protection "n" (zone 2)	GYJ111111X
- Marking	Ex nL IIB/IIC T4/T6 Ex nA II T4/T6
- Connection	$U_i = 45 \text{ V DC}$
- Effective internal inductance	$L_i = 400 \text{ mH}$
- Effective inner capacitance	$C_i = 6 \text{ nF}$

1) The total performance includes the errors caused by temperature effects, static pressure effects and conformity error, including hysteresis and repeatability.

2) Not in combination with span "G".

HART communication

Load with connection of	
• HART communicator	$R_B = 230 \dots 1100 \Omega$
• HART modem	$R_B = 230 \dots 500 \Omega$
Cable	2 wire shielded: $\leq 3.0 \text{ km}$ (1.86 miles), multiwire shielded: $\leq 1.5 \text{ km}$ (0.93 miles)
Protocol	HART Version 6.0
PC/laptop requirements	IBM compatible, RAM > 32 MByte, hard disk > 70 MByte, depending on modem type: RS 232-interface or USB connection, VGA graphics
Software for computer	SIMATIC PDM 6.0

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

1

Selection and Ordering data

Article No.

Pressure transmitters for differential pressure and flow, SITRANS P500 HART, PN 160 (MAWP 2320 psi)

7MF54 - - - - 0

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Enclosure

Die-cast aluminum, dual compartment
Die-cast aluminum, dual compartment

Thread for cable gland

M20x1.5
½-14 NPT

Output

4 ... 20 mA, HART

Measuring cell filling

Silicone oil

Measuring cell cleaning

normal

Measuring span

1.25 ... 250 mbar	(0.5 ... 100.4 inH ₂ O)
6.25 ... 1250 mbar	(2.5 ... 502 inH ₂ O)
31.25 ... 6250 mbar	(12.54 ... 2509 inH ₂ O)
0.16 ... 32 bar	(2.33 ... 465 psi)

Wetted parts materials

(stainless steel process flanges)

Seal diaphragm	Process connection
Stainless steel 1.4404/316L	Stainless steel 1.4404/316L
Hastelloy C276 ¹⁾	Stainless steel 1.4404/316L
Monel 400 ¹⁾	Stainless steel 1.4404/316L

Process connection

Female thread ¼-18 NPT

- Sealing screw opposite process connection
 - Mounting thread 7/16 - 20 UNF according to EN 61518
 - Mounting thread M10 to DIN 19213
- Vent on side of process flange²⁾
 - Mounting thread 7/16 - 20 UNF according to EN 61518
 - Mounting thread M10 to DIN 19213

¹⁾ Can be ordered for measuring ranges D, E, F and G.

²⁾ Not in conjunction with remote seals.

7	M	F	5	4	-	-	-	-	0
			0						
			1						
			3						
					1				
						D			
						E			
						F			
						G			
							A		
							B		
							C		
								0	
								1	
									4
									5

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

1

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order code.		Further designs Add "-Z" to Article No. and specify Order code.	
Attachments		Degree of protection approvals: Ex ia/ib (intrinsic safety)	
Mounting bracket made of steel	A01	Ex ia/ib protection (ATEX) (T4)	E00
Mounting bracket made of stainless steel	A02	Ex IS protection (FM) (T4)	E01
Display (Standard: no display, cover closed)		Ex IS protection (cCSA _{US}) (T4)	E02
With display and blanking cover	A10	Ex ia/ib protection (NEPSI) (T4)	E06
With display and glass cover	A11	Degree of protection approvals: Ex d (flameproof)	
Special casing / cover version		Ex d explosion-proof (ATEX)(T4/T6)	E20
Two coats of lacquer on casing, cover (PU on epoxy)	A20	Ex XP explosion-proof and DIP (FM)(T4/T6)	E21
Electrical connection and cable entry (Standard: no cable gland, only dust protection caps)		Ex XP explosion-proof and DIP (cCSA _{US})(T4/T6)	E22
Cable gland made of plastic (IP66/68) ⁴⁾	A50	Ex d explosion-proof (NEPSI)(T4/T6)	E26
Cable glands made of metal (IP66/68)	A51	Degree of protection approvals: n/NI	
Cable glands made of stainless steel (IP66/68)	A52	Zone 2 (nA, nL, ic) (ATEX) (T4/T6)	E40
M12 connectors without cable socket (IP66/67) ⁴⁾	A60	Div2 NI, Div2 NI-field wiring (FM) (T4/T6)	E41
M12 connectors complete with cable socket (IP66/67) ⁴⁾	A61	Zone 2 (nA, nL), Div2 NI (cCSA _{US}) (T4/T6)	E42
Han 7D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾	A71	Zone 2 (nA, nL) (NEPSI) (T4/T6)	E46
Han 7D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾	A72	Degree of protection approvals: Dust Zone 20/21/22	
Han 7D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾	A73	Use in Zone 21/22 (Ex tD) (ATEX)	E60
Han 7D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾	A74	Use in Zone 20/21/22 (Ex iaD) (ATEX)	E61
Han 8D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾ ⁸⁾	A75	Use in Zone 21/22 (Ex DIP) (NEPSI)	E66
Han 8D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾ ⁸⁾	A76	Degree of protection approvals: Combinations	
Han 8D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾ ⁸⁾	A77	IS protection and XP and DIP (FM)	E71
Han 8D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾ ⁸⁾	A78	IS protection and XP and DIP (cCSA _{US})	E72
PG 13.5 adapters ⁴⁾	A82	IS protection and XP and DIP (FM/cCSA _{US})	E73
Language for labels, leporellos, menu language default⁹⁾ (instead of English as standard)		Supplementary approvals/degree of protection	
German	B10	Dual Seal approval ⁵⁾	E85
French	B12	Export approval Korea	E86
Spanish	B13	Special process connection versions (diff. pressure)	
Italian	B14	Side vents for gas measurements ⁷⁾	L32
Chinese	B15	Swap process connection: high-pressure side at front	L33
Russian	B16	Mosquito protection	
Japanese	B17	4 pcs. for ¼-18 NPT thread	L36
English with units psi/inH ₂ O/°F	B21	Process flanges, O-rings, special material Standard: Viton (FKM) (FPM)	
Special version: Supplementary menu languages (Standard: English, German, French, Spanish, Italian)		Process conn. sealing rings made of PTFE (Teflon), virginal	L60
Asia language package (in addition: Chinese, Japanese, Russian)	B80	Process connection sealing rings made of PTFE (Teflon), glass fiber-reinforced	L61
Certificates (available online for downloading) ¹⁾		Process connection sealing rings made of FFPM (Kalrez) ¹⁰⁾	L62
Quality inspection certificate (Five-step factory calibration) according to IEC 60770-2 ²⁾	C11	Process connection sealing rings made of NBR	L63
Acceptance test certificate according to EN 10204-3.1 ³⁾	C12	Process connection sealing rings made of graphite	L64
		Drain/Vent valve (1 set = 2 units)	
		2 ventilation valves ¼- 18 NPT, in material of process flanges)	L80
		Remote seals	
		Transmitters with connection of remote seal ⁶⁾ (For premounted valve manifolds see page 1/203)	V00

¹⁾ Enclosed in print or as CD: see page 1/201.

²⁾ When also ordering the quality inspection certificate (factory calibration) according to IEC 60770-2 for transmitters with mounted diaphragm seals: Order this certificate only together with the remote seals. The measuring accuracy of the total combination is certified here.

³⁾ When also ordering the acceptance test certificate according to EN 10204-3.1 for transmitters with mounted diaphragm seals: Order this certificate as well in addition to the respective remote seals.

⁴⁾ Not together with types of protection "Explosion-proof", "Ex nA" and "Intrinsic safety and explosion-proof"

⁵⁾ Only in conjunction with FM and/or cCSA_{US}

⁶⁾ Please select a remote seal separately. Also refer to the information under footnote 2). Remote seals see page 1/199.

⁷⁾ Only in conjunction with process connection "Vent on side".

⁸⁾ The Han 8D plug is identical with the former Han 8U version.

⁹⁾ For option B15, B16 and B17 the menu language default is english. Otherwise the Option B80 (Asia language package) is necessary.

¹⁰⁾Not together with Measuring span "G".

Selection and Ordering data	Order code
<p>Additional data Please add "-Z" to Article No. and specify Order code(s) and plain text.</p>	
<p>Measuring range to be set Specify in plain text:</p> <ul style="list-style-type: none"> • In the case of linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi • In the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi 	<p>Y01</p> <p>Y02</p>
<p>Measuring point number and measuring point identifier (only standard ASCII character set) Specify in plain text:</p> <p>Measuring point number (TAG No.), max. 16 characters Y15:</p> <p>Measuring point text (max. 27 char.) Y16:</p> <p>Entry of HART address (TAG), max. 32 characters Y17:</p>	<p>Y15</p> <p>Y16</p> <p>Y17</p>
<p>Setting of pressure indication in pressure units Specify in plain text (standard setting: mbar) Y21: bar, kPa, MPa, psi, ...</p> <p>Note: The following pressure units are selectable: bar, mbar, mm H₂O[*], in H₂O[*], ftH₂O[*], mmHG, inHG, psi, Pa, kPa, MPa, g/cm², kg/cm², Torr, ATM, % or mA</p> <p>*) Reference temperature 20 °C</p>	<p>Y21</p>
<p>Setting of pressure indication in non-pressure units¹⁾ Specify in plain text: Y22: ... up to ... l/min, m³/h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)</p>	<p>Y22 + Y01 or Y02</p>
<p>Customer-specific settings Damping setting (range: 0 ... 100 s) (Standard setting: 2 s)</p>	<p>Y30</p>

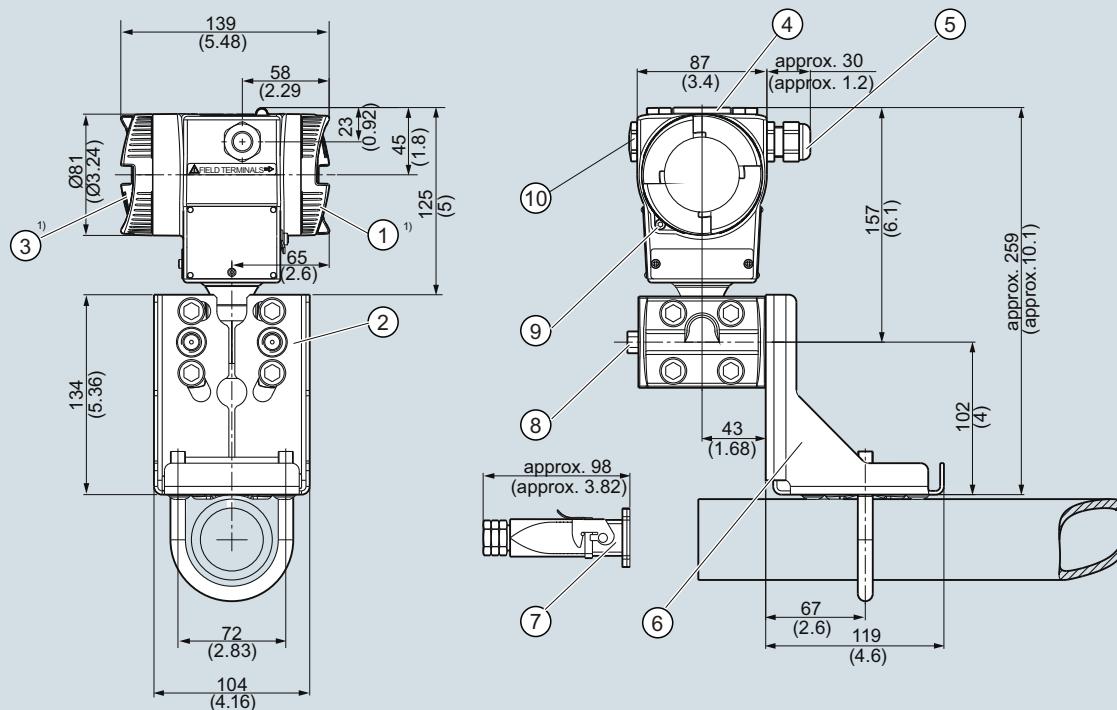
¹⁾ Preset values can only be changed over SIMATIC PDM.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

Dimensional drawings



- 1 Terminal side
- 2 Process connection: 1/4-18 NPT (EN61518)
- 3 Electronics side, digital display
- 4 Protective cover for the pushbuttons
- 5 Cable entry:
 - Screwed gland M20 x 1.5³⁾
 - Screwed gland 1/2-14 NPT
 - Han 7D/Han 8D connector²⁾³⁾
 - M12 connector
- 6 Mounting bracket (optional)

- 7 Electrical connection:
 - Han 7D/Han 8D connector/socket²⁾³⁾
 - 8 Vent valve (optional)
 - 9 Safety catch
 - 10 Blanking plug
- 1) Allow approx. 20 mm (0.79 inch) additional thread length to permit unscrewing
 - 2) Not with type of protection "Explosion-proof"
 - 3) Not with type of protection "FM + cCSA_{US} [IS + XP]"

SITRANS P pressure transmitter for differential pressure and flow, P500 series, measurements in mm (inch)

Technical specifications

Input		Output	
Measured variable	Level	Output current signal	4 ... 20 mA
Span (infinitely adjustable)	Span (min. ... max.)	<ul style="list-style-type: none"> Lower current limit (freely adjustable) Upper current limit (freely adjustable) Ripple (without HART communication) adjustable damping current transmitter Failure signal 	3.55 mA, factory setting 3.8 mA 23 mA, factory setting 20.5 mA $I_{pp} \leq 0.4$ of max. output current 0... 100 s in steps of 0.1 s, factory setting 2 s 3.55 ... 23 mA Adjustable within limits: <ul style="list-style-type: none"> Lower: 3.55 ... 3.7 mA (factory setting 3.6 mA) Upper: 21.0 ... 23 mA (factory setting 22.8 mA)
	1.25 ... 250 mbar (0.5 ... 100 inH ₂ O) 6.25 ... 1250 mbar (2.5 ... 500 inH ₂ O) 31.25 ... 6250 mbar (12.54 ... 2509 inH ₂ O)		
	Maximum operating pressure		
	See "Mounting flange"		
Lower range limit	-100 % of max. span or 500 mbar a (7.25 psia) vacuum resistance		
<ul style="list-style-type: none"> Measuring cell with silicone oil filling 	Also available as vacuum-resistant remote seal: 30 mbar a (0.44 psia)		
Upper range limit	100% of max. span		
Start of scale	Between measuring limits (freely adjustable)		
Measuring accuracy		Rated conditions	
Reference conditions (in accordance with IEC 60770-1)	<ul style="list-style-type: none"> Rising characteristic curve Start of scale 0 bar Stainless steel seal diaphragm Measuring cell with silicone oil filling Room temperature (25 °C (77 °F)) 	Mounting position	Defined by flange
All error information always refers to the set span.		Ambient conditions	<ul style="list-style-type: none"> Ambient temperature (Note: Observe the temperature class in areas subject to explosion hazard.) - total device - Readable display - Storage temperature
Error in measurement at limit setting incl. hysteresis and reproducibility		Climatic class	<ul style="list-style-type: none"> Condensation
r: Span ratio (r = max. span / set span)		Degree of protection to IEC 60529	IP66/IP68 and NEMA 4X (with corresponding cable gland)
Linear characteristic	$r \leq 10$ $r \geq 10$	Electromagnetic Compatibility	<ul style="list-style-type: none"> Emitted interference and interference immunity
<ul style="list-style-type: none"> 250 mbar (100 inH₂O) 1250 mbar (502 inH₂O) 6250 mbar (2509 inH₂O) 	≤ 0.03 % $\leq (0.003 \cdot r)$ %	Permissible pressures	According to 97/23/EC pressure equipment directive
		Medium temperature of high-pressure side	<ul style="list-style-type: none"> Measuring cell with silicone oil filling - $p_{abs} \geq 1$ bar - $p_{abs} < 1$ bar
		Design	
		Weight	<ul style="list-style-type: none"> To EN (pressure transmitter with mounting flange, without tube) To ASME (pressure transmitter with mounting flange, without tube)
			approx. 9.8 ... 11.8 kg (21.6... 26.0 lb) approx. 9.8 ... 16.8 kg (21.6 ... 37.0 lb)
		Long-term stability	$\leq (0.05 \cdot r)$ % per 5 years $\leq (0.08 \cdot r)$ % per 10 years
		Influence of ambient temperature per 28 °C (50 °F) ¹⁾	<ul style="list-style-type: none"> 250 mbar (100 inH₂O) 1250 mbar (502 inH₂O) 6250 mbar (2509 inH₂O)
		Influence of static pressure	<ul style="list-style-type: none"> At the start of scale value (PKN) - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O) On the span (PKS) - 250 mbar (100 inH₂O) - 1250 mbar (502 inH₂O) - 6250 mbar (2509 inH₂O)
		Influence of power supply	$\leq (0.025 \cdot r + 0.014)$ % $\leq (0.006 \cdot r + 0.03)$ % $\leq (0.035 \cdot r)$ % je 70 bar (1015 psi) correction via zero point correction $\leq (0.007 \cdot r)$ % je 70 bar (1015 psi) correction via zero point correction ≤ 0.03 % je 70 bar (1015 psi) ≤ 0.09 % je 70 bar (1015 psi) ≤ 0.005 %/1 V

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

Material of wetted parts at the high-pressure side		Auxiliary power supply	
• Seal diaphragm of mounting flange	Stainless steel 1.4404/316L, Hastelloy C276, mat. no. 2.4819, Monel 400, mat. no. 2.4360, Tantal, PFA auf Edelstahl 1.4404/316L, PTFE auf Edelstahl 1.4404/316L	Terminal voltage on transmitter	<ul style="list-style-type: none"> • DC 10.6 ... 44 V • With intrinsically-safe operation DC 10.6 ... 30 V
• Sealing face	Smooth to EN 1092-1, Form B1 and/or ASME B16.5 RF 125 ... 250 AA for stainless steel 316L, EN 1092-1 Form B2 and/or ASME B16.5 RFSF in the case of other materials	Certificates and approvals	
• Sealing material in the process connection		Classification according to PED 97/23/EC	
- O-Ring	<ul style="list-style-type: none"> • Standard: Viton (FKM (FPM)) • Optional: NBR, PTFE (virginal), PTFE (glas fiber-reinforced), FFPM (Kalrez), Graphite 	• PN 160 (MAWP 2320 psi)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
- For vacuum application of mounting flange	copper	Explosion protection	
Material of wetted parts at the low-pressure side		<u>Explosion protection for Europe (to ATEX)</u>	
• Seal diaphragm	Stainless steel, mat. no. 1.4404/316L, Hastelloy C276, Monel 400	• Intrinsic safety "i"	PTB 09 ATEX 2004 X
• Process connection and sealing screw	• Stainless steel, mat. no. 1.4404/316L	- Marking	Ex II 1/2 G Ex ia/ib IIC T4
• Sealing material in the process connection		- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)
- O-Ring	<ul style="list-style-type: none"> • Standard: Viton (FKM (FPM)) • Optional: NBR, PTFE (virginal), PTFE (glas fiber-reinforced), FFPM (Kalrez), Graphite 	- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$
Material of parts not in contact with media		- Effective internal inductance:	$L_i = 400 \mu\text{H}$
Electronics housing	<ul style="list-style-type: none"> • Low copper die-cast aluminum AC-AlSi12 (Fe) or AC-AlSi 10 Mg (Fe) to DIN EN 1706 • Lacquer on polyurethane base, optional epoxy-based primer • Stainless steel serial plate 	- Effective inner capacitance:	$C_i = 6 \text{ nF}$
Process connection screws	Stainless steel	• Explosion-proof "d"	BVS 09 ATEX E 027
Measuring cell filling	Silicone oil	- Marking	Ex II 1/2 G Ex d IIC T4/T6
• Liquid mounting flange	Silicone oil or other material	- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
Process connection		- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
• High-pressure side	Flange to EN and ASME	• Dust explosion protection for zone 20	PTB 09 ATEX 2004 X
• Low-pressure side	¼-18 NPT female thread and flange connection with M10 to DIN 19213 or 7/16-20 UNF mounting thread to IEC 61518	- Marking	Ex II 1 D Ex iaD 20 T 120 °C
Electrical connection	<ul style="list-style-type: none"> • Screw terminals • Cable entry via the following screwed glands: <ul style="list-style-type: none"> - M20 x 1.5 - ½-14 NPT - Han 7D/Han 8D connector - M12 plug 	- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)
Displays and controls		- Max. surface temperature	120 °C (248 °F)
Push buttons	3; for operation directly on the device	- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$
Display	<ul style="list-style-type: none"> • With or without integrated display • Cover with or without window 	- Effective internal inductance:	$L_i = 400 \mu\text{H}$
		- Effective inner capacitance:	$C_i = 6 \text{ nF}$
		• Dust explosion protection for zone 21/22	BVS 09 ATEX E 027
		- Marking	Ex II 2 D Ex tD A21 IP68 T120 °C Ex ia D21
		- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$; $P_{\text{max}} = 1.2 \text{ W}$
		• Type of protection "n" (zone 2)	PTB 09 ATEX 2004 X
		- Marking	Ex II 3 G Ex nA II T4/T6 Ex II 2/3 G Ex ib/nL IIC T4/T6 Ex II 2/3 G Ex ib/ic IIC T4/T6
		- "nA" connection	$U_m = 45 \text{ V DC}$
		- "nL, ic" connection	$U_i = 45 \text{ V}$
		- Effective internal inductance	$L_i = 400 \mu\text{H}$
		- Effective inner capacitance	$C_i = 6 \text{ nF}$

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

1

<u>Explosion protection for USA (to FM)</u>		<u>Explosion protection for China (acc. to NEPSI)</u>	
Certificate of Compliance	No. 3033013	• Intrinsic safety "i"	GYJ111111X
• Identification (XP/DIP) or (IS)	XP CL I, DIV 1, GP ABCDEFG T4 / T6 DIP CL II, III, DIV1, GP EFG T4/T6 IS CL I, II, III, DIV1, GP ABCDEFG T4 CL I, Zone 0, AEx ia IIC T4 CL I, Zone 1, AEx ib IIC T4	- Marking	Ex ia/ib IIB/IIC T4
- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C}$ (-40 ... +185 °F) $T_a = T6: -40 \dots +60 \text{ °C}$ (-40 ... +140 °F)	- Permissible ambient temperature	40 ... +85 °C (-40 ... +185 °F)
- Entity parameters	According to "control drawing": A5E02189134N $U_m = 30 \text{ V}, I_m = 100 \text{ mA},$ $P_i = 750 \text{ mW}, L_i = 400 \text{ μH}, C_i = 6 \text{ nF}$	- Connection	To certified intrinsically-safe circuits with maximum values: $U_i = 30 \text{ V}, I_i = 100 \text{ mA}, P_i = 750 \text{ mW}$
• Marking (NI/NO)	NI CL I, DIV 2, GP ABCD T4/T6 NI CL I, Zone 2, GP IIC T4/T6 S CL II, III, GPFG T4/T6 NI CL I, DIV 2, GP ABCD T4/T6, NIFW NI CL I, Zone 2, GP IIC T4/T6, NIFW NI CLII, III, DIV 2, GP FG T4/T6, NIFW	- Effective internal inductance	$L_i = 400 \text{ mH}$
- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C}$ (-40 ... +185 °F) $T_a = T6: -40 \dots +60 \text{ °C}$ (-40 ... +140 °F)	- Effective inner capacitance	$C_i = 6 \text{ nF}$
- (NI/S) parameters	According to "control drawing": A5E02189134N $U_m = 45 \text{ V}, L_i = 400 \text{ μH}, C_i = 6 \text{ nF}$	• Explosion-proof "d"	GYJ111112
<u>Explosion protection for Canada (to cCSA US)</u>		- Marking	Ex dia IIC T4/T6
Certificate of Compliance	No. 2280963	- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
• Marking (XP/DIP)	CL I, DIV 1, GP ABCD T4 /T6; CL II, DIV 1, GP EFG T4/T6	- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C}$ (-40 ... +185 °F) $T_a = T6: -40 \dots +60 \text{ °C}$ (-40 ... +140 °F)	• Dust explosion protection for zone 21/22	GYJ111112
- Entity parameters	According to "control drawing": A5E02189134N, $U_m = 45 \text{ V}$	- Marking	DIP A21 TA,T120 °C IP68 D21
• Marking (ia/ib)	CL I, Ex ia/Ex ib IIC, T4 CL II, III, Ex ia/Ex ib, GP EFG, T4 CL I, AEx ia/AEx ib IIC, T4 CL II, III, AEx ia/ AEx ib, GP EFG, T4	- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C}$ (-40 ... +185 °F)	• Type of protection "n" (zone 2)	GYJ111111X
- Entity parameters	$U_i = 30 \text{ V}, I_i = 100 \text{ mA}, P_i = 750 \text{ mW},$ $R_i = 300 \text{ Ω}, L_i = 400 \text{ μH}, C_i = 6 \text{ nF}$	- Marking	Ex nL IIB/IIC T4/T6 Ex nA II T4/T6
• Marking (NI/n)	CL I, DIV2, GP ABCD T4/T6 CL II, III, DIV2, GP FG T4/T6 Ex nA IIC T4/T6 AEx nA IIC T4/T6 Ex nL IIC T4/T6 AEx nL IIC T4/T6	- Connection	$U_i = 45 \text{ V DC}$
- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C}$ (-40 ... +185 °F) $T_a = T6: -40 \dots +60 \text{ °C}$ (-40 ... +140 °F)	- Effective internal inductance	$L_i = 400 \text{ mH}$
- NI/nA parameters	According to "control drawing": A5E02189134N, $U_m = 45 \text{ V}$	- Effective inner capacitance	$C_i = 6 \text{ nF}$
- nL parameters	According to "control drawing": A5E02189134N, $U_i = 45 \text{ V},$ $I_i = 100 \text{ mA}, L_i = 400 \text{ μH},$ $C_i = 6 \text{ nF}$		
		1) Only relevant for the pressure transmitter. The temperature error of the remote seal must be calculated separately.	
		2) This value may be increased if the process connection is sufficiently insulated.	
HART communication			
Load with connection of			
• HART Communicator		$R_B = 230 \dots 1100 \text{ Ω}$	
• HART modem		$R_B = 230 \dots 500 \text{ Ω}$	
Cable		2 wire shielded: ≤ 3.0 km (1.86 miles), multiwire shielded: ≤ 1.5 km (0.93 miles)	
Protocol		HART Version 6.0	
PC/laptop requirements		IBM compatible, RAM > 32 MByte, hard disk > 70 MByte, depending on modem type: RS 232-interface or USB connection, VGA graphics	
Software for computer		SIMATIC PDM 6.0	

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

1

Selection and Ordering data

Pressure transmitters for level, SITRANS P500 HART

Article No.

Order code

7MF56 - 0 -

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Enclosure

Die-cast aluminum, dual compartment

Die-cast aluminum, dual compartment

Thread for cable gland

M20x1.5

½-14 NPT

Output

4 ... 20 mA, HART

Measuring cell filling

Silicone oil

Measuring cell cleaning

normal

Measuring span (min. ... max.)

1.25 ... 250 mbar (0.5 ... 100 inH₂O)6.25 ... 1250 mbar (2.5 ... 500 inH₂O)31.25 ... 6250 mbar (12.54 ... 2509 inH₂O)

Wetted parts of the low-pressure side

(stainless steel process flanges)

Seal diaphragm

Process connection

Stainless steel 1.4404/316L Stainless steel 1.4404/316L

Hastelloy C276 Stainless steel 1.4404/316L

Monel 400 Stainless steel 1.4404/316L

Process connection of low-pressure side

Female thread ¼-18 NPT

- Sealing screw opposite process connection
 - Mounting thread 7/16 - 20 UNF according to IEC 61518
 - Mounting thread M10 to DIN 19213
- Vent on side of process flange
 - Mounting thread 7/16 - 20 UNF according to IEC 61518
 - Mounting thread M10 to DIN 19213

Wetted parts materials (high-pressure side)

Stainless steel 1.4404/316L

Hastelloy C276 mat. no. 2.4819

Monel 400 mat. no. 2.4360

Tantalum

PFA coated on stainless steel

PTFE on stainless steel 1.4404/316L (not in combination with an extension)

Other version

Add Order code and plain text:

Material: ... ; Extension length: ...

Process connection on high-pressure side: Extension length

None

50 mm (1.97 inch)

100 mm (3.94 inch)

150 mm (5.90 inch)

200 mm (7.87 inch)

Other version: See option "9" for "Wetted parts materials"

Process connection on high-pressure side: Nominal diameter/Nominal pressure

DN 50, PN 40⁶⁾

DN 80, PN 40

DN 100, PN 16

DN 100, PN 40

2", class 150⁶⁾2", class 300⁶⁾

3", class 150

3", class 300

4", class 150

4", class 300

Other version, add

Order code and plain text:

Nominal diameter: ... ; Nominal pressure: ...

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

1

Selection and Ordering data	Article No.	Order code
Pressure transmitters for level, SITRANS P500 HART	7MF56 - - - - - 0 - - - - -	
Process connection on high-pressure side: Filling liquid		
Silicone oil M5		0
Silicone oil M50		1
High-temperature oil		2
Halocarbon (for oxygen measurement)		3
FDA compliant oil		4
Other version, add		9
Order code and plain text:		R 1 Y
Filling liquid: ...		

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

1

Selection and Ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order code.	
Display (Standard: no display, cover closed)	
With display and blanking cover	A10
With display and glass cover	A11
Special version: cover/casing	
Two coats of lacquer on casing, cover (PU on epoxy)	A20
Electrical connection and cable entry (Standard: no cable gland, only dust protection caps)	
Cable gland made of plastic (IP66/68) ⁴⁾	A50
Cable glands made of metal (IP66/68)	A51
Cable glands made of stainless steel (IP66/68)	A52
M12 connectors without cable socket (IP66/67) ⁴⁾	A60
M12 connectors, cable socket (IP66/67) ⁴⁾	A61
Han 7D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾	A71
Han 7D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾	A72
Han 7D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾	A73
Han 7D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾	A74
Han 8D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾⁷⁾	A75
Han 8D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾⁷⁾	A76
Han 8D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾⁷⁾	A77
Han 8D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾⁷⁾	A78
PG 13.5 adapters ⁴⁾	A82
Language for labels, leprellos and menu language default⁸⁾ (instead of English as standard)	
German	B10
French	B12
Spanish	B13
Italian	B14
Chinese	B15
Russian	B16
Japanese	B17
English with units: psi/inH ₂ O	B21
Special version: Supplementary menu languages (Standard: English, German, French, Spanish, Italian)	
Asia language package (in addition: Chinese, Japanese, Russian)	B80
Certificates (available online for downloading)¹⁾	
Quality inspection certificate (Five-step factory calibration) according to IEC 60770-2 ²⁾	C11
Acceptance test certificate according to EN 10204-3.1 ³⁾	C12
Degree of protection approvals: Ex ia/ib (intrinsic safety)	
Ex ia/ib protection (ATEX) (T4)	E00
Ex IS protection (FM) (T4)	E01
Ex IS protection (C _{CSA} US) (T4)	E02
Ex ia/ib protection (NEPSI) (T4)	E06

Selection and Ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order code.	
Degree of protection approvals: Ex d (flameproof)	
Ex d explosion-proof (ATEX)(T4/T6)	E20
Ex XP explosion-proof and DIP (FM)(T4/T6)	E21
Ex XP explosion-proof and DIP (C _{CSA} US)(T4/T6)	E22
Ex d explosion-proof (NEPSI)(T4/T6)	E26
Degree of protection approvals: n/NI	
Zone 2 (nA, nL, ic) (ATEX) (T4/T6)	E40
Div2 NI, Div2 NI-field wiring (FM) (T4/T6)	E41
Zone 2 (nA, nL), Div2 NI (C _{CSA} US) (T4/T6)	E42
Zone 2 (nA, nL) (NEPSI) (T4/T6)	E46
Degree of protection approvals: Zone 20/21/22	
Use in Zone 21/22 (Ex tD) (ATEX)	E60
Use in Zone 20/21/22 (Ex iaD) (ATEX)	E61
Use in Zone (Ex DIP) (ATEX)	E66
Degree of protection approvals: Combinations	
IS protection and XP and DIP (FM)	E71
IS protection and XP and DIP (C _{CSA} US)	E72
IS protection and XP and DIP (FM/C _{CSA} US)	E73
Supplementary approvals / degree of protection	
Dual Seal approval ⁵⁾	E85
Export approval Korea	E86
Special process connection versions (diff. pressure)	
Swap process connection: high-pressure side at front	L33
Mosquito protection	
4 pcs. for ¼-18 NPT thread	L36
Process flanges, O-rings, special material Standard: Viton (FKM) (FPM)	
Process connection sealing rings made of PTFE (Teflon), virginal	L60
Process connection sealing rings made of PTFE (Teflon), glass fiber-reinforced	L61
Process connection sealing rings made of FFPM (Kalrez)	L62
Process connection sealing rings made of NBR	L63
Process connection sealing rings made of graphite	L64
Drain/Vent valve (1 set = 2 units)	
2 ventilation valves ¼- 18 NPT, in material of process flange)	L80
Vacuum-proof design	
Vacuum service	V04
Spark arrester For mounting on zone 0 (including documentation)	V05

1) Enclosed in print or as CD: see page 1/201.

2) When also ordering the quality inspection certificate (factory calibration) according to IEC 60770-2 for transmitters with mounted diaphragm seals: Order this certificate only together with the remote seals. The measuring accuracy of the total combination is certified here.

3) When also ordering the acceptance test certificate according to EN 10204-3.1 for transmitters with mounted diaphragm seals: Order this certificate as well in addition to the respective remote seals.

4) Not together with types of protection "Explosion-proof", "Ex nA" and "Intrinsic safety and explosion-proof"

5) Only in conjunction with FM and/or C_{CSA}US

6) Not recommended for Measuring span "D"

7) The Han 8D plug is identical with the former Han 8U version.

8) For option B15, B16 and B17 the menu language default is english. Otherwise the Option B80 (Asia language package) is necessary.

Selection and ordering data	Order code
<p>Additional data Please add "-Z" to Article No. and specify Order code(s) and plain text.</p>	
<p>Measuring range to be set Specify in plain text: Linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, kPa, MPa, psi</p>	Y01
<p>Measuring point number and measuring point identifier (only standard ASCII character set) Specify in plain text: Measuring point number (TAG No.), max. 16 characters Y15:</p>	Y15
<p>Measuring point text (max. 27 char.) Y16:</p>	Y16
<p>Entry of HART address (TAG), max. 32 characters Y17:</p>	Y17
<p>Setting of pressure indication in pressure units Specify in plain text (standard setting: mbar) Y21: bar, kPa, MPa, psi, ... Note: The following pressure units are selectable: bar, mbar, mm H₂O[*], in H₂O[*], ftH₂O[*], mmHG, inHG, psi, Pa, kPa, MPa, g/cm², kg/cm², Torr, ATM, % or mA *) Reference temperature 20 °C</p>	Y21
<p>Setting of pressure indication in non-pressure units¹⁾ Specify in plain text: Y22: ... up to ... l/min, m³/h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)</p>	Y22 + Y01
<p>Customer-specific settings Damping setting (range: 0 ... 100 s) (Standard setting: 2 s)</p>	Y30

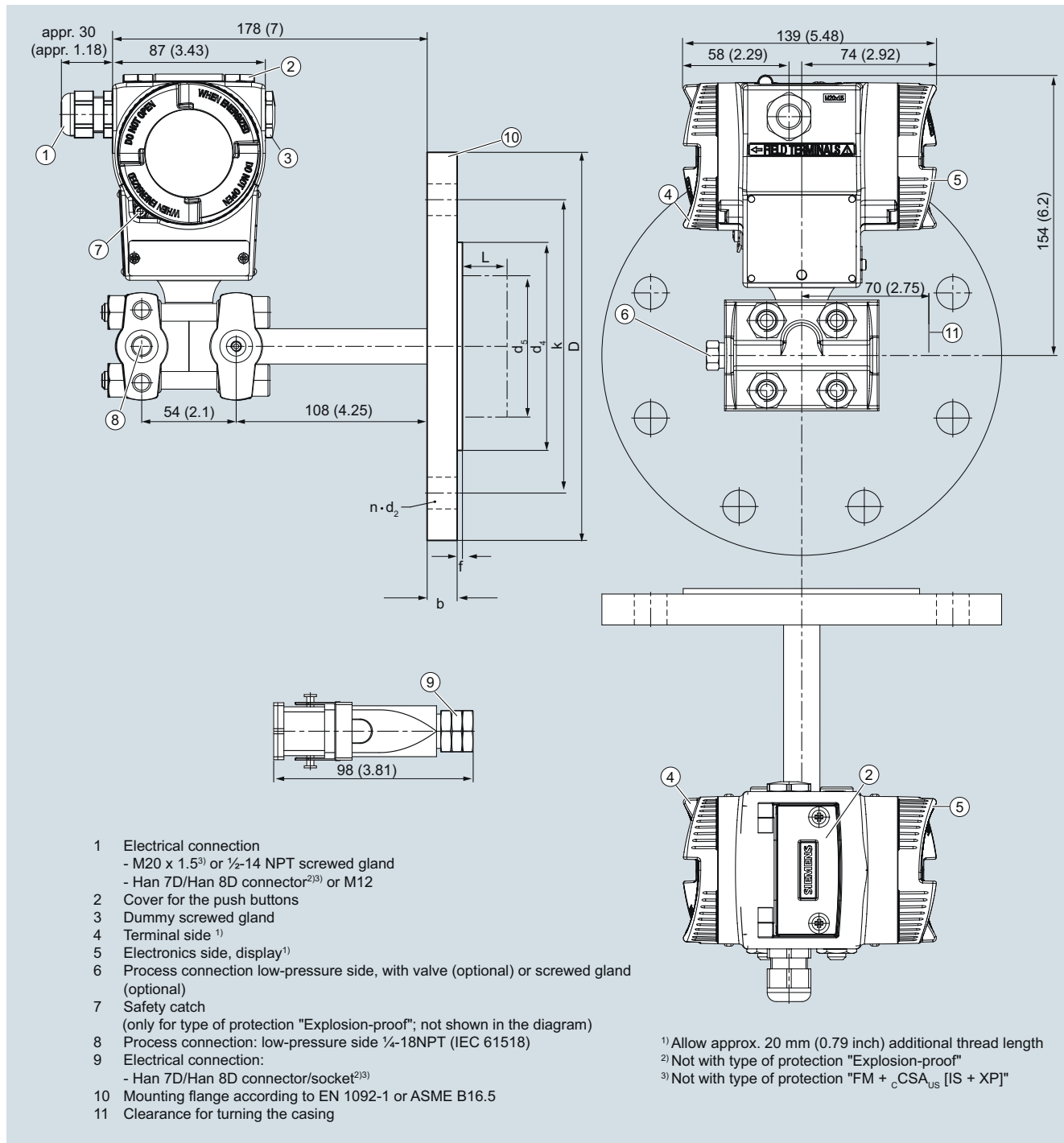
¹⁾ Preset values can only be changed over SIMATIC PDM.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

Dimensional drawings



SITRANS P pressure transmitter for filling level, P500 series, measurements in mm (inch)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

1

Connection to EN 1092-1

Nominal diameter	Nominal pressure	b	D	d	d ₂	d ₄	d ₅	d _M	f	k	n	L
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
DN50	PN 40	20	165	61	18	102	48.3	45 ¹⁾	2	125	4	0, 50, 100, 150 or 200
DN 80	PN 40	24	200	90	18	138	76	72 ²⁾	2	160	8	
DN 100	PN 16	20	220	115	18	158	94	89	2	180	8	
	PN 40	24	235	115	22	162	94	89	2	190	8	

Connection to ASME B16.5

Nominal diameter	Nominal pressure	b	D	d ₂	d ₄	d ₅	d _M	f	k	n	L
		lb/sq.in.	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)
2 inch	class 150	0.77 (19.5)	5.91 (150)	0.75 (19.0)	3.62 (92)	1.9 (48.3)	1.77 (45) ¹⁾	0.079 (2.0)	4.75 (120.7)	4	0, 2, 3.94, 5.94 or 7.87
	class 300	0.89 (22.7)	6.49 (165)	0.75 (19.0)	3.62 (92)	1.9 (48.3)	1.77 (45) ¹⁾	0.079 (2.0)	5.0 (127)	8	
3 inch	class 150	0.96 (24.3)	7.5 (190.5)	0.75 (19.0)	5 (127)	3.0 (76)	2.83 (72) ²⁾	0.079 (2.0)	6 (152.4)	4	
	class 300	1.14 (29.0)	8.27 (210)	0.87 (22.2)	5 (127)	3.0 (76)	2.83 (72) ²⁾	0.079 (2.0)	6.69 (168.3)	8	
4 inch	class 150	0.96 (24.3)	9.06 (230)	0.75 (19.0)	6.19 (157.2)	3.69 (94)	3.5 (89)	0.079 (2.0)	7.5 (190.5)	8	
	class 300	1.27 (32.2)	10.04 (255)	0.87 (22.2)	6.19 (157.2)	3.69 (94)	3.5 (89)	0.079 (2.0)	7.88 (200)	8	

Explanations of tables:

d: Internal diameter of gasket to DIN 2690

d_M: Effective diaphragm diameter

d₅: Diameter of extension

f: Milling edge

L: Extension length

¹⁾ 59 mm = 2.32 inch with tube length L=0..

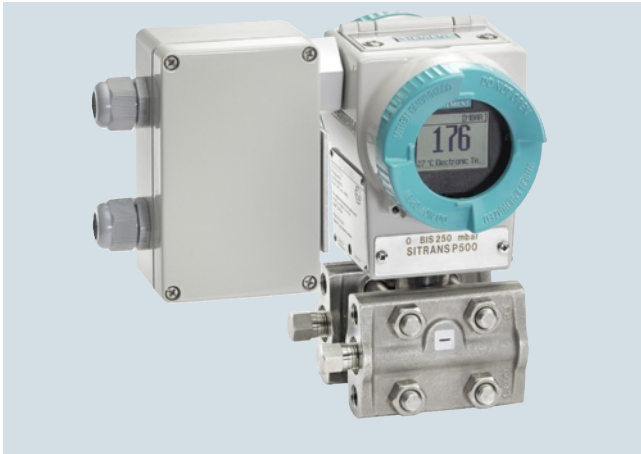
²⁾ 89 mm = 3½ inch with tube length L=0.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 - Supplementary electronics for 4-wire connection

Overview



SITRANS P pressure transmitter with supplementary electronics for 4-wire connection

Direct connection of the supplementary electronics to a SITRANS P pressure transmitter from the P500 series produces a transmitter for four-wire connection.

The supplementary electronics cannot be attached to explosion-protected pressure transmitters. The supplementary electronics is fitted in a light metal housing which is mounted on the left side of the pressure transmitter.

Note on ordering:

The supplementary electronics has to be ordered through the **supplementary options** of the pressure transmitter in question.

Technical specifications

Output

Output signal	0 ... 20 mA or 4 ... 20 mA
Load	Max. 750 Ω
Voltage measurement	Linear (square-rooting in transmitter if necessary)
Electrical isolation	Between power supply and input/output

Measuring accuracy

	According to IEC 60770-1
Conformity error (in addition to transmitter)	≤ 0.15 % of set span
Influence of ambient temperature	≤ 0.1 % per 10 K
Power supply effect	≤ 0.1 % per 10 % change in voltage or frequency
Load effect	≤ 0.1 % per 100 % change

Rated conditions

Ambient temperature	
• 24 V version	-20 ... +80 °C (-4 ... +176 °F)
• 230 V version	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
Degree of protection	IP54 to IEC 60529
Electromagnetic compatibility (EMC)	IEC 61236-1
Condensation	Relative humidity 0 ... 95 % condensation permissible

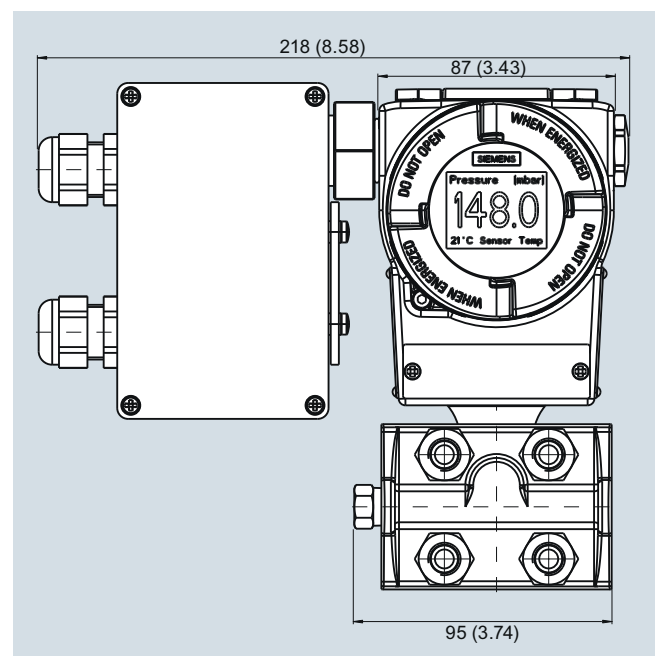
Structural design

Dimensions (W x H x D) in mm (inch)	80 x 120 x 60 (3.15 x 4.72 x 2.36)
Electrical connection	Screw terminals (Pg 13.5 cable inlet) or Han 7D / Han 8D plug

Power supply

Supply voltage	230 V AC (-10 ... +6 %, 47 ... 63 Hz, approx. 6 VA) or 24 V AC/DC (24 V AC ± 10 %, 47 ... 63 Hz, approx. 3 VA)
Permissible ripple (within the specified limits)	Approx. 2.5 V _{pp}

Dimensional drawings

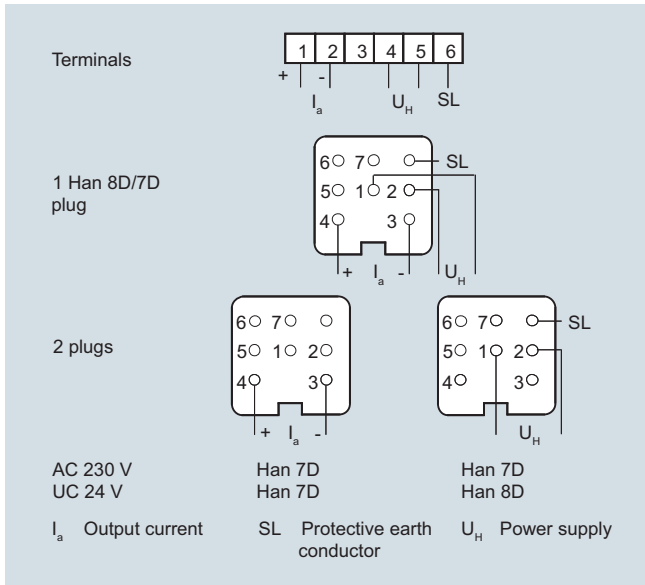


SITRANS P pressure transmitters with supplementary electronics for four-wire connection, dimension drawing, dimensions in mm (inch)

Pressure Measurement Transmitters for High Performance requirements

SITRANS P500 - Supplementary electronics for 4-wire connection

Schematics



Supplementary electronics for 4-wire connection, connection diagram (the HAN 8D connector is identical to the previous version of the HAN 8U)

Selection and Ordering data

Order code

Supplementary electronics for 4-wire connection		V
Article No. of the transmitter 7MF54..-..... or 7MF56..-..... add "-Z" and Order code.		
Power supply	Electrical connection	
24 V AC/DC	Terminals; 2 Pg screwed glands, to left	1
	2 Han 7D/Han 8D plugs incl. mating connector, to left	3
	1 Han 7D plug incl. mating connector, angled	5
	Terminals; 1 Pg screwed gland, downwards	6
	1 Han 8D plug incl. mating connector, downwards (observe arrangement of plug and differential pressure line)	9
230 V AC	Terminals; 2 Pg screwed glands, to left	7
	2 Han 7D plugs incl. mating connector, to left	8
Output current		
0 ... 20 mA		0
4 ... 20 mA		1
Accessories	Article No.	
Instruction Manual German/English	A5E00322799	

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Accessories/Spare parts

1

Selection and ordering data		Article No.
Replacement measuring cells for differential pressure SITRANS P pressure transmitters for differential pressure and flow, P500 HART PN 160 series (MAWP 2320 psi)		7MF5994 - 1
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Measuring cell filling Silicone oil	Measuring cell cleaning normal	1
Measuring span (min. ... max.)		
1.25 ... 250 mbar	(0.5 ... 100.4 inH ₂ O)	D
6.25 ... 1250 mbar	(2.5 ... 502 inH ₂ O)	E
31.25 ... 6250 mbar	(12.54 ... 2509 inH ₂ O)	F
0.16 ... 32 bar	(2.33 ... 465 psi)	G
Wetted parts materials (stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel 1.4404/316L	Stainless steel 1.4404/316L	A
Hastelloy C276	Stainless steel 1.4404/316L	B
Monel 400	Stainless steel 1.4404/316L	C
Process connection Female thread 1/4-18 NPT		
• Sealing screw opposite process connection		
- Mounting thread 7/16-20 UNF to IEC 61518		0
- Mounting thread M10 to DIN 19213		1
• Vent on side of process flange		
- Mounting thread 7/16-20 UNF to IEC 61518		4
- Mounting thread M10 to DIN 19213		5
Further designs		Order code
Add "-Z" to Article No. and specify Order code.		
Acceptance test certificate		C12
Acc. to EN 10204-3.1		
Without process flanges		K00
Vent on side for gas measurements ¹⁾		L32
Process flanges, O-ring, special material Standard: Viton (FKM (FPM))		
Process connection sealing rings made of PTFE (Teflon), virginal		L60
Process connection sealing rings made of PTFE (Teflon), glass fiber-reinforced		L61
Process connection sealing rings made of FFPM (Kalrez) ²⁾		L62
Process flanges, O-rings made of NBR		L63
Process flanges, O-rings made of graphite		L64

¹⁾ Only in conjunction with process connection code 4 or 5.

²⁾ Not together with Measuring span "G".

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Accessories/Spare parts

1

Selection and Ordering data

	Article No.
Mounting brackets For differential pressure transmitters with flange thread M10 (7MF54...10 and 7MF54...50) <ul style="list-style-type: none"> Made of steel Made of stainless steel 	7MF5987-1AA 7MF5987-1AD
Mounting brackets for differential pressure transmitter with flange thread 7/16-20 UNF (7MF54...00 and 7MF54...40) <ul style="list-style-type: none"> Made of steel Made of stainless steel 	7MF5987-1AC 7MF5987-1AF
Cover Made of die-cast aluminum, including O-ring <ul style="list-style-type: none"> Without window With window 	7MF5987-1BE 7MF5987-1BF
Digital indicator Including mounting material	7MF5987-1BR
TAG plate (incl. fastening material) Without inscription (5 pcs.) Printed (1 pc.) Data according to Y01 or Y02, Y15 and Y16 (see "SITRANS P transmitters")	7MF5987-1CA 7MF5987-1CB-Z Y... ..
Mounting screws For TAG plate, grounding and connection terminals and securing and locking screws (30 units)	7MF5987-1CC
Sealing plugs for process flange (1 set = 2 units) <ul style="list-style-type: none"> Made of stainless steel Made of Hastelloy 	7MF4997-1CG 7MF4997-1CH
Vent valve Complete (1 set = 2 units) <ul style="list-style-type: none"> Made of stainless steel Made of Hastelloy 	7MF4997-1CP 7MF4997-1CQ
Electronics module HART, intrinsically safe Ex ia for installation in transmitter casing (observe warranty conditions)	7MF5987-1DC
Connection board (incl. fastening material) HART, intrinsically safe Ex ia for installation in transmitter casing (observe warranty conditions)	7MF5987-1DM
O-rings for process flanges made of: <ul style="list-style-type: none"> Viton (FKM (FPM)) (10 pcs.) NBR (Buna N) (10 pcs.) 	7MF5987-2DA 7MF5987-2DE
Push buttons assembly (incl. fastening material) For replacement of operating keys for on-site operation of the transmitter	7MF5987-2AF
Sealing ring for <ul style="list-style-type: none"> Process connection NBR sealing ring for screw cover (10 pcs.) NBR sealing ring for interface measuring cell/housing (10 pcs.) 	See catalog FI01, "Fittings" 7MF4997-2EA 7MF5987-2EB

Selection and Ordering data

	Article No.
Operating Instructions¹⁾ German English French Italian Spanish	A5E02344527 A5E02344528 A5E02344529 A5E02344530 A5E02344531
Compact operating instructions¹⁾ English, German, Spanish, French, Italian, Dutch English, Estonian, Latvian, Lithuanian, Polish, Romanian English, Bulgarian, Czech, Finnish, Slovakian, Slovenian English, Danish, Greek, Portuguese, Swedish, Hungarian Russian	A5E02344532 A5E02307339 A5E02307340 A5E02307341 A5E02307338
Brief instructions (Leporello) German, English, French, Italian, Spanish, Chinese	A5E02344536
DVD with SITRANS P documentation German, English, French, Spanish, Italian Compact operating instructions in 21 EU languages	A5E00090345
Service Instructions¹⁾ for replacement of electronics, measuring cell and terminal board <ul style="list-style-type: none"> German English 	A5E02822443 A5E02344534
HART modem With USB interface	7MF4997-1DB
Operating instruction¹⁾ Supplementary electronics for 4-wire connection German, English	A5E00322799
Certificates (order only via SAP) additional to internet download <ul style="list-style-type: none"> Hard copy (to order) On CD (to order) 	A5E03252406 A5E03252407

¹⁾ You can download these operating instructions free-of-charge from our Internet site at www.siemens.com/sitransp.

► Available ex stock.

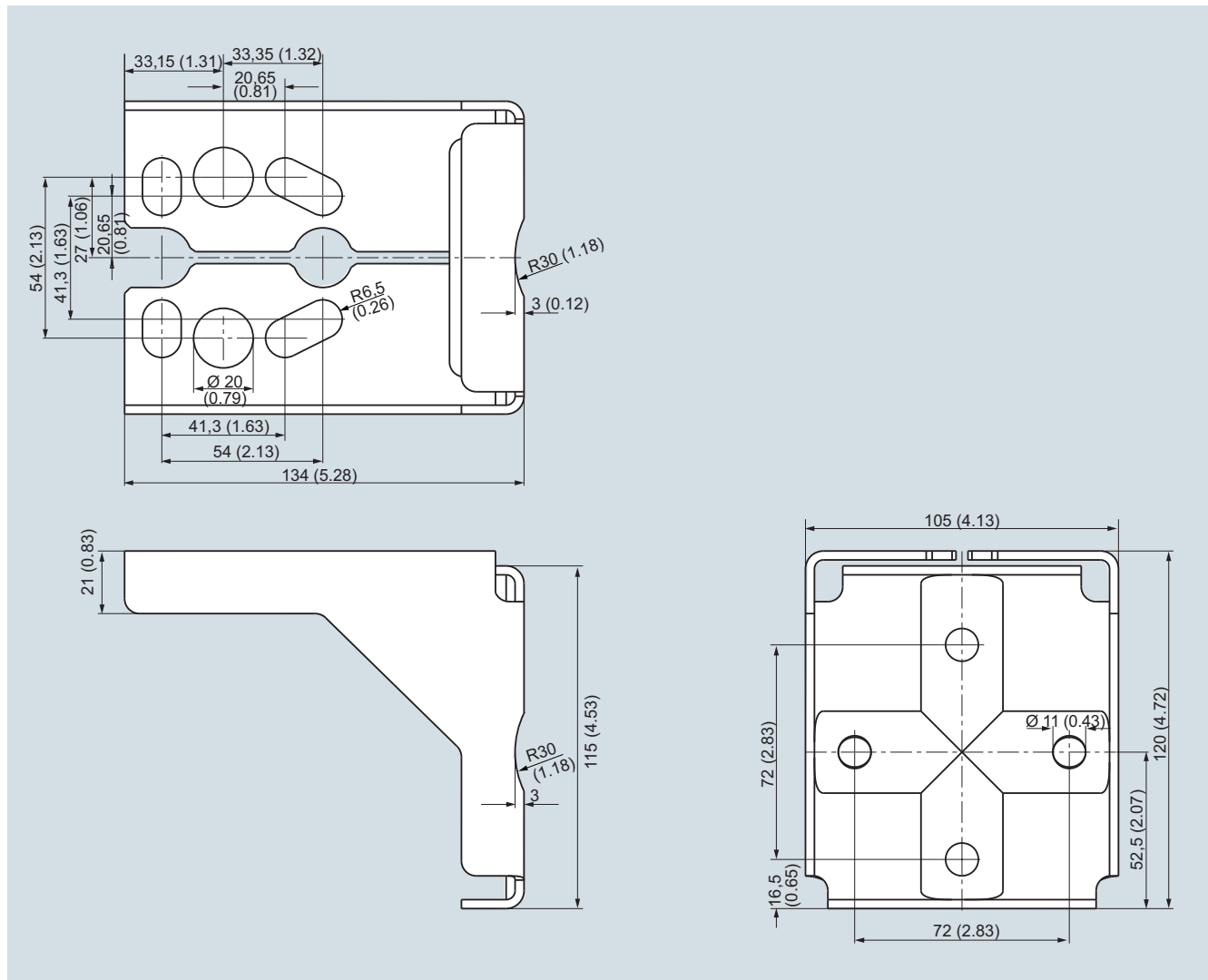
For power supply units, see catalog FI01 "Supplementary Components".

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Accessories/Spare parts

Dimensional drawings



Mounting bracket for SITRANS P pressure transmitter, P500 series, measurements in mm (inch)

Mounting bracket material: Sheet-steel Mat. No. 1.0330, chrome-plated, or stainless steel Mat. No. 1.4301 (304)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Factory-mounting of valve manifolds on transmitters

1

Overview

The SITRANS P500 transmitter can be delivered factory-fitted with the following manifolds:

- Valve manifolds 7MF9411-5BA: Three valve manifold for differential pressure transmitter
- Valve manifolds 7MF9411-5CA: Three valve manifold for differential pressure transmitter

Design

The 7MF9411-5BA and 7MF9411-5CA manifolds are sealed with PTFE sealing rings between the transmitter and the manifold.

Once installed, the complete unit is checked under pressure for leaks (compressed air 6 bar (2411 inH₂O)) and is certified leak-proof with a test report to EN 10204 - 2.2.


All manifolds should preferably be secured with the respective mounting brackets. The transmitters are mounted on the manifold and not on the unit itself.

If you order a mounting bracket when choosing the option "Factory mounting of manifolds", you will receive a mounting bracket for the manifold instead of a bracket for mounting the transmitter.


If you order an acceptance test certificate 3.1 to EN10204 when choosing the option "Factory mounting of manifolds", a separate certificate is provided for the transmitters and the manifolds respectively.

Selection and ordering Data

Manifold 7MF9411-5BA on SITRANS P pressure transmitter P500 for differential pressure and flow

	Add -Z to the Article No. of the transmitter and add Order codes	Order code
	SITRANS P500 7MF54...-...	
	mounted with gaskets made of PTFE and screws made of	
	<ul style="list-style-type: none"> • Chromized steel • Stainless steel 	U01 U02
	Delivery incl. high-pressure test certified by factory certificate to EN10204-2.2	
	Further designs:	
	Delivery includes mounting bracket and mounting clips made of	
	<ul style="list-style-type: none"> • Steel • Stainless steel 	A01 A02
	(instead of the mounting bracket supplied with the transmitter)	
	Supplied acceptance test certificate to EN10204-3.1 for transmitters and mounted valve manifold	C12

Manifold 7MF9411-5CA on SITRANS P500 pressure transmitter for differential pressure and flow

	Add -Z to the Article No. of the transmitter and add Order codes	Order code
	SITRANS P500 7MF54...-...	
	mounted with gaskets made of PTFE and screws made of	
	<ul style="list-style-type: none"> • Chromized steel • Stainless steel 	U03 U04
	Delivery incl. high-pressure test certified by factory certificate to EN10204-2.2	
	Further designs:	
	Delivery includes mounting bracket and mounting clips made of	
	<ul style="list-style-type: none"> • Steel • Stainless steel 	A01 A02
	(instead of the mounting bracket supplied with the transmitter)	
	Supplied acceptance test certificate to EN10204-3.1 for transmitters and mounted valve manifold	C12

Pressure Measurement

Transmitters for High Performance requirements

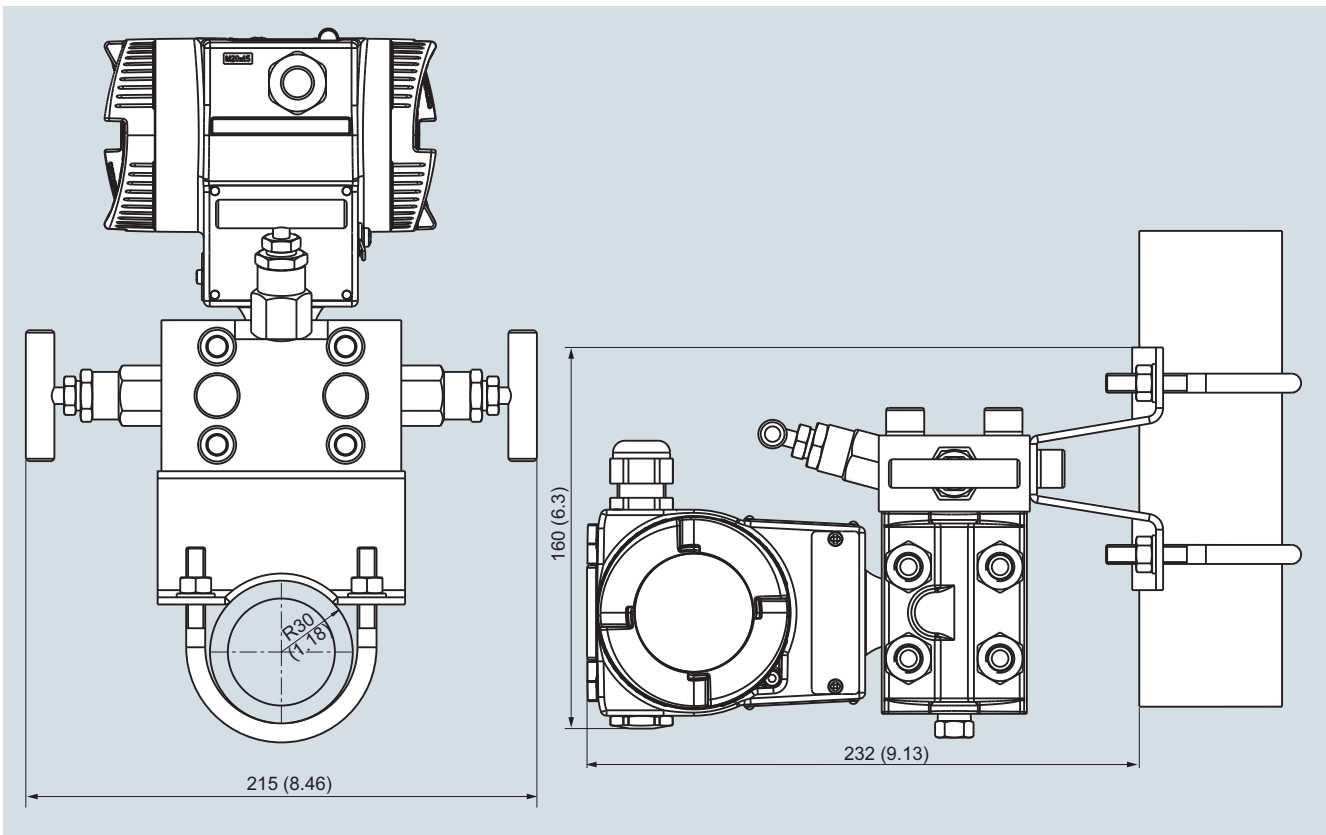
SITRANS P500 Factory-mounting of valve manifolds on transmitters

1

Dimensional drawings



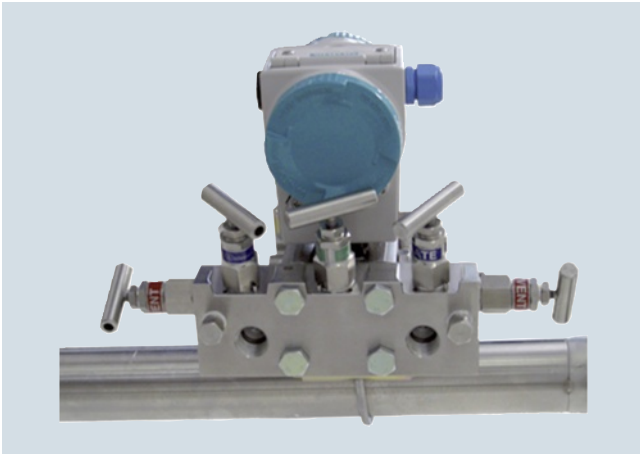
Manifold 7MF9411-5BA with attached SITRANS P500 pressure transmitter for differential pressure and flow (incl. mounting bracket)



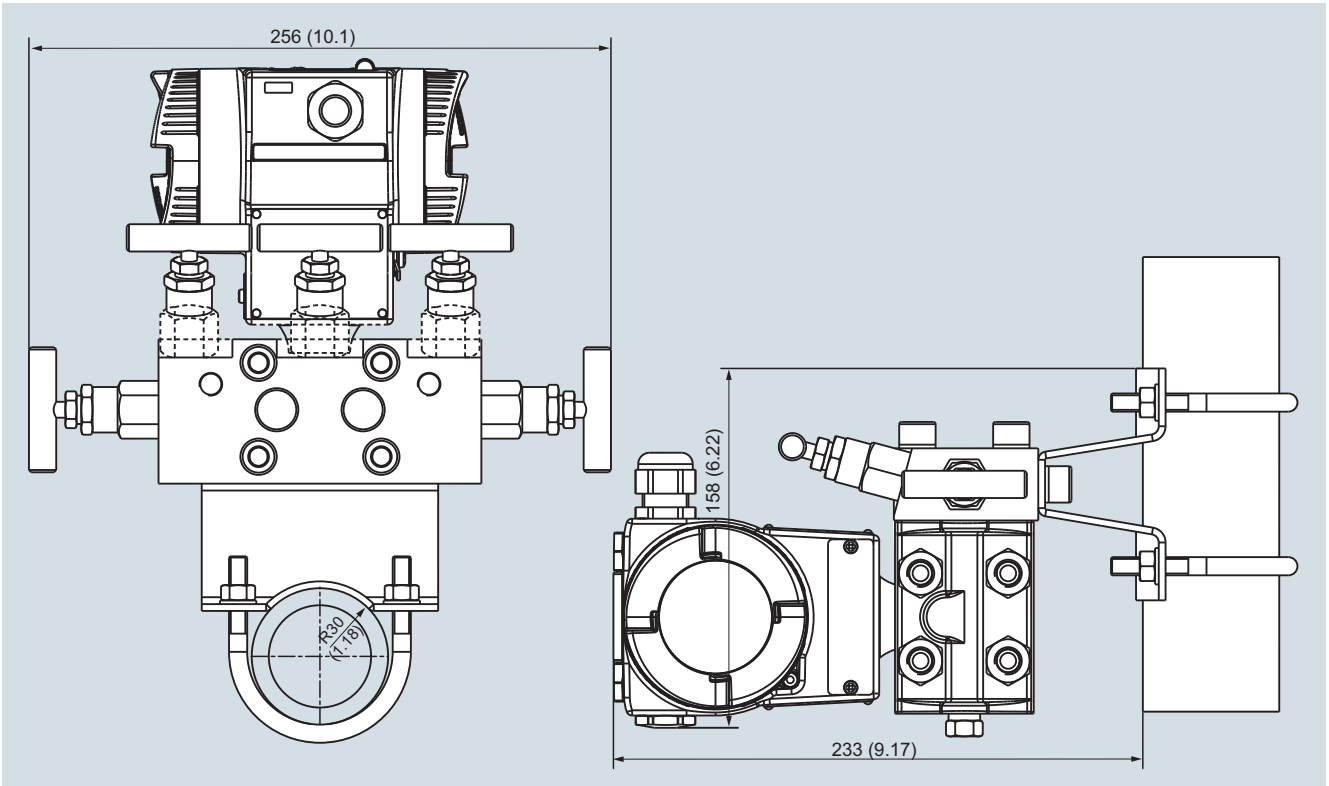
Manifold 7MF9411-5BA with attached SITRANS P500 pressure transmitter for differential pressure and flow, measurements in mm (inch)

Pressure Measurement Transmitters for High Performance requirements

SITRANS P500 Factory-mounting of valve manifolds on transmitters



Manifold 7MF9411-5CA with attached SITRANS P500 pressure transmitter for differential pressure and flow (incl. mounting bracket)



Manifold 7MF9411-5CA with attached SITRANS P500 pressure transmitter for differential pressure and flow, measurements in mm (inch)

Pressure Measurement

Remote seals for transmitters and pressure gauges

Technical description

Overview

In many cases the pressure transmitter and the measured medium have to be physically separated. It is then necessary to use a remote seal.

The remote seals can be used with the following SITRANS P pressure transmitter series:

- Pressure (P300, DS III with HART, DS III with PROFIBUS PA, DS III with FOUNDATION Fieldbus)
- Absolute pressure (P300, DS III with HART, DS III with PROFIBUS PA, DS III with FOUNDATION Fieldbus)
- Differential pressure and flow (P500, DS III with HART, DS III with PROFIBUS PA, DS III with FOUNDATION Fieldbus)

Note

When configuring your remote seal, be sure to read the information about transmission response, temperature error and response time to be found in the sections "Function" and "Technical data". Only then will the remote seal work to optimum effect.

Benefits

- No direct contact between the pressure transmitter and the medium
- Individual configuration of the pressure transmitter for perfect adaptation to the operating conditions
- Available in many versions
- Specially designed for difficult operating conditions
- Quick-release versions available for the food industry

Application

Remote seal systems should be used if a separation between the measured medium and the measuring instrument is essential or appropriate.

Examples of such cases:

- The temperature of the medium is outside the limits specified for the pressure transmitter.
- The medium is corrosive and requires diaphragm materials which are not available for the pressure transmitter.
- The medium is highly viscous or contains solids which would block the measuring chambers of the pressure transmitter.
- The medium may freeze in the measuring chambers or pulse line.
- The medium is heterogeneous or fibrous.
- The medium tends towards polymerization or crystallization.
- The process requires quick-release remote seals, as necessary e.g. in the food industry for fast cleaning.
- The process requires cleaning of the measuring point, e.g. in a batch process.

Design

A remote seal system consists of the following components.

- Pressure transmitter
- One or two remote seals
- Filling liquid
- Connection between pressure transmitter and remote seal (direct mounting or by means of capillary)

The volume in contact with the measured medium is terminated by a flat elastic diaphragm lying in a bed. Between the diaphragm and the pressure transmitter is the filling liquid.

In many cases, a capillary has to be connected between the remote seal and the pressure transmitter in order e.g. to minimize temperature effects on the latter when hot media are involved.

However, the capillary influences the response time and the temperature response of the complete remote seal system. Two capillaries of equal length must always be used to connect a remote seal to a pressure transmitter for differential pressure.

The remote seal can be optionally equipped with a projecting diaphragm (tube).

Remote seals of sandwich design are fitted with a dummy flange.

Designs

Diaphragm seal

With diaphragm seals, the pressure is measured by means of a flat diaphragm which rests in a bed.

The following types of diaphragm seals exist:



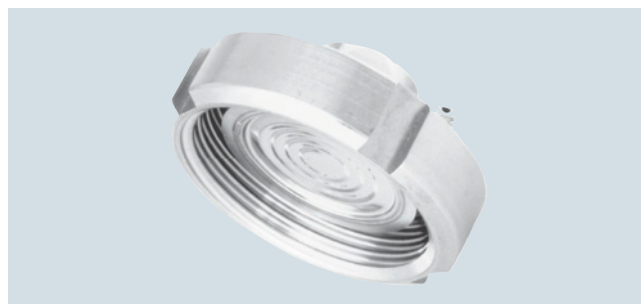
Diaphragm seal of sandwich design without (left) and with a projecting diaphragm (tube)

- Sandwich design
- Sandwich design with projecting diaphragm (tube) to DIN or ASME which are secured using a dummy flange.



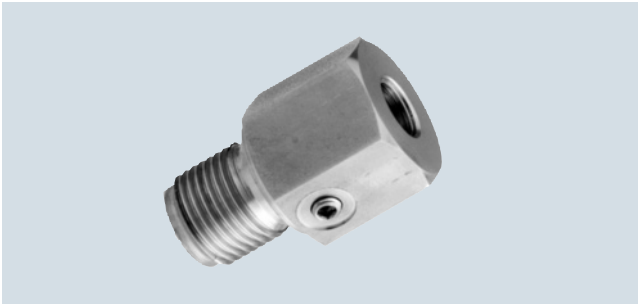
Diaphragm seal of flange design without (left) and with a projecting diaphragm (tube)

- Flange design
- Flange design with projecting diaphragm (tube) to DIN or ASME, secured using holes in the flange.



Quick-release diaphragm seal

- Quick-release remote seals, e.g. to DIN 11851, SMS standard, IDF standard, APV RJF standard, clamp connection, etc.
- Miniature diaphragm seal with male thread for screwing into tapped holes
- Remote seals with customer-specific process connections



Miniature diaphragm seal with diaphragm flush with front

- Miniature diaphragm seals

The quick-release remote seals are used above all in the food industry. Their design means that the measured medium cannot accumulate in dead volumes. The quick-release clamp present on the remote seal means that quick dismounting is possible for cleaning.

Clamp-on seal



Clamp-on seal with quick-release design (left) and for flange mounting

With clamp-on seals, the pressure is first measured using a cylindrical diaphragm positioned in a pipe, and then transmitted to the pressure transmitter by means of the filling liquid.

The clamp-on seal is a special design for flowing media. It consists of a cylindrical pipe in which a cylindrical diaphragm is embedded. Since it is completely integrated in the process pipe, no turbulences, dead volumes or other obstructions to the flow occur. Furthermore, the clamp-on seal can be cleaned by a pig.

The following types of clamp-on seals exist:

- Quick-release clamp-on seals, e.g. to DIN 11851, SMS standard, IDF standard, APV/RJF standard, clamp connection etc. The quick-release facility attached to the remote seal enables the seal to be removed quickly for cleaning purposes.
- Clamp-on seals for flanging to EN or ASME.
- Clamp-on seals with customer-specific process connections.

Note:

The pressure data on the transmitter and the remote seal must be observed with regard to pressure/temperature behavior.

Function

The measured pressure is transferred from the diaphragm to the filling liquid and passes through the capillary to the measuring chamber of the pressure transmitter. The interior of the diaphragm seal and of the capillary, as well as the measuring chamber of the transmitter, are filled gas-free by the filling liquid.

Transmission response

The transmission response of a remote seal is characterized by the following variables:

- Temperature error
- Adjustment time

Temperature error

Temperature errors are caused by the change of volume of the filling liquid due to temperature variations. To select the right remote seal you must calculate the temperature error.

Below you will find an overview of the factors which influence the size of the temperature error, as well as information on how to calculate the temperature error.

The temperature error is dependent on the following variables:

- Rigidity of the diaphragm used
- Filling liquid used
- Influence of the filling liquid underneath the process flanges or in the connection shank of the pressure transmitter
- Internal diameter of the capillary: The bigger the internal diameter, the bigger the temperature error
- Length of the capillary: The longer the capillary, the bigger the temperature error

Diaphragm rigidity

The rigidity of the diaphragm is of decisive importance. The bigger the diameter of the diaphragm, the softer the diaphragm and the more sensitively it reacts to temperature-induced changes in volume of the filling liquid.

The result is that small measuring ranges are only possible with large diaphragm diameters.

Other factors apart from diaphragm rigidity which also play a role:

- Diaphragm thickness
- Diaphragm material
- Coatings if present

Filling liquid

Every filling liquid reacts to temperature variations with a change of volume. Temperature errors can be minimized by selecting a suitable filling liquid, but the filling liquid must also be appropriate for the temperature limits and operating pressure. Furthermore, the filling liquid must also be physiologically harmless.

Since the filling liquid is present under the diaphragm, in the capillary and under the process flange of the pressure transmitter (or in the connection shank), the temperature error must be calculated separately for each combination.

Note:

A vacuum-resistant remote seal is recommended for continuous low-pressure operation at 500 mbar or below, including during commissioning (see ordering data).

An example of a temperature error calculation can be found in the section "Technical Specifications".

Pressure Measurement

Remote seals for transmitters and pressure gauges

Technical description

Response time

The response time is dependent on the following factors:

- Internal diameter of the capillary: The bigger the internal diameter, the shorter the response time
- Viscosity of the filling liquid: The greater the viscosity, the longer the response time
- Length of the capillary: The longer the capillary, the longer the response time
- Pressure in the pressure measuring system: The higher the pressure, the shorter the response time

Recommendations

The following should be observed to obtain an optimum combination of transmitter and remote seal:

- Choose the biggest possible diameter for the remote seal. The effective diameter of the seal diaphragm is then bigger and the temperature error smaller.
- Choose the shortest possible capillary. The response time is then shorter and the temperature error smaller
- Choose the filling liquid with the least viscosity and the smallest coefficient of expansion. Make sure, however, that the filling liquid meets the process requirements with regard to pressure, vacuum and temperature. And ensure that the filling liquid and the medium are compatible with one another.
- Note the following points for use in the vacuum range:
 - The pressure transmitter must always be positioned below the lowest spigot.
 - The operating range of some filling liquids is very limited with regard to the permissible temperature of the medium.
 - A vacuum-proof seal is necessary for continuous operation in the low-pressure range.
- Recommendations for the minimum span can be found in the section "Technical data".

Note

The remote seals listed here are a selection of the most common designs. On account of the large variety of process connections, certain remote seals which are not listed here may be available nevertheless.

Other versions can be:

- Other process connections, standards
- Aseptic or sterile connections
- Other dimensions
- Other nominal pressures
- Special diaphragm materials, including coatings
- Other sealing faces
- Other filling liquids
- Other capillary lengths
- Sheathing of capillaries with protective hose
- Calibration at higher/lower temperatures etc.

Please contact your local Siemens office for further information.

Pressure Measurement

Remote seals for transmitters and pressure gauges

Technical description

1

Technical specifications

Temperature error Diaphragm seals

Temperature errors of diaphragm seals when connected to pressure transmitters for pressure, absolute pressure, differential pressure (single-sided) and level

	Nominal diameter/ design	Diaphragm diameter		Temperature error of remote seal f_{RS}		Temperature error of capillary f_{Cap}		Temperature error of process flange/connec- tion spigot f_{PF}		Recommended min. spans (guid- ance values, observe temp. error)	
		mm	(inch)	mbar/ 10 K	(psi/ 10 K)	mbar/ (10 K · m_{Cap})	(psi/ (10 K · m_{Cap}))	mbar/ 10 K	(psi/ 10 K)	mbar	(psi)
Sandwich design or with flange to EN 1092-1	DN 50 without tube	59	(2.32)	1.5	(0.022)	2	(0.029)	2	(0.029)	200	(2.90)
	DN 50 with tube	45	(1.89)	5	(0.073)	10	(0.145)	10	(0.145)	500	(7.25)
	DN 80 without tube	89	(3.50)	0.2	(0.003)	0.2	(0.003)	0.2	(0.003)	100	(1.45)
	DN 80 with tube	72	(2.83)	1	(0.015)	1	(1.015)	1	(1.015)	250	(3.63)
	DN 100 without tube	89	(3.50)	0.2	(0.003)	0.4	(0.006)	0.4	(0.006)	100	(1.45)
	DN 100 with tube	89	(3.50)	0.4	(0.006)	0.4	(0.006)	0.4	(0.006)	100	(1.45)
	DN 125 without tube	124	(4.88)	0.2	(0.003)	0.1	(0.002)	0.1	(0.002)	20	(0.29)
	DN 125 with tube	124	(4.88)	0.2	(0.003)	0.1	(0.002)	0.1	(0.002)	20	(0.29)
Sandwich design or with flange to ASME B16.5	2 inch without tube	59	(2.32)	1.5	(0.022)	2	(0.029)	2	(0.029)	200	(2.90)
	2 inch with tube	45	(1.89)	5	(0.073)	10	(0.145)	10	(0.145)	500	(7.25)
	3 inch without tube	89	(3.50)	0.2	(0.003)	0.2	(0.003)	0.2	(0.003)	100	(1.45)
	3 inch with tube	72	(2.83)	1	(0.015)	1	(1.015)	1	(1.015)	250	(3.63)
	4 inch without tube	89	(3.50)	0.2	(0.003)	0.4	(0.006)	0.4	(0.006)	100	(1.45)
	4 inch with tube	89	(3.50)	0.4	(0.006)	0.4	(0.006)	0.4	(0.006)	100	(1.45)
	5 inch without tube	124	(4.88)	0.2	(0.003)	0.1	(0.002)	0.1	(0.002)	20	(0.29)
	5 inch with tube	124	(4.88)	0.2	(0.003)	0.1	(0.002)	0.1	(0.002)	20	(0.29)
Remote seal with union nut to DIN 11851	DN 25	25	(0.98)	20	(0.290)	60	(0.870)	60	(0.870)	6000	(87)
	DN 32	32	(1.26)	8	(0.116)	25	(0.363)	25	(0.363)	4000	(58)
	DN 40	40	(1.57)	4	(0.058)	10	(0.145)	10	(0.145)	2000	(29)
	DN 50	52	(2.05)	4	(0.058)	5	(0.073)	5	(0.073)	500	(7.25)
	DN 65	59	(2.32)	3	(0.044)	4	(0.058)	4	(0.058)	500	(7.25)
	DN 80	72	(2.83)	1	(0.015)	1	(0.015)	1	(0.015)	250	(3.63)
Remote seal, screwed gland design	DN 50	52	(2.05)	4	(0.058)	5	(0.073)	5	(0.073)	500	(7.25)
Remote seal with threaded socket to DIN 11851	DN 25	25	(0.98)	20	(0.290)	60	(0.870)	60	(0.870)	6000	(87)
	DN 32	32	(1.26)	8	(0.116)	25	(0.363)	25	(0.363)	4000	(58)
	DN 40	40	(1.57)	4	(0.058)	10	(0.145)	10	(0.145)	2000	(29)
	DN 50	52	(2.05)	4	(0.058)	5	(0.073)	5	(0.073)	500	(7.25)
	DN 65	59	(2.32)	3	(0.044)	4	(0.058)	4	(0.058)	500	(7.25)
	DN 80	72	(2.83)	1	(0.015)	1	(0.015)	1	(0.015)	250	(3.63)
Clamp connec- tion	1½ inch	32	(1.26)	8	(0.116)	25	(0.363)	25	(0.363)	4000	(58)
	2 inch	40	(1.57)	4	(0.058)	10	(0.145)	10	(0.145)	2000	(29)
	2½ inch	59	(2.32)	3	(0.044)	5	(0.073)	5	(0.073)	500	(7.25)
	3 inch	72	(2.83)	1	(0.015)	1	(0.015)	1	(0.015)	250	(3.63)
Miniature dia- phragm seal	G1B	25	(0.98)	20	(0.290)	60	(0.870)	60	(0.870)	6000	(87)
	G1½B	40	(1.57)	4	(0.058)	10	(0.145)	10	(0.145)	2000	(29)
	G2B	52	(2.05)	4	(0.058)	5	(0.073)	5	(0.073)	500	(7.25)

Remarks:

- Values apply for the filling liquids silicone oil M5, silicone oil M50, high-temperature oil, halocarbon oil and food oil (FDA listed).
- Values apply to stainless steel as the diaphragm material.

Pressure Measurement

Remote seals for transmitters and pressure gauges

Technical description

Temperature errors of diaphragm seals with connection to differential pressure transmitters (double-sided)

	Nominal diameter/ design	Diaphragm diameter		Temperature error of remote seal f_{RS}		Temperature error of capillary f_{Cap}		Temperature error of process flange/connec- tion spigot f_{PF}		Recommended min. spans (guidance val- ues, observe temperature error)	
		mm	(inch)	mbar/ 10 K	(psi/ 10 K)	mbar/ (10 K · m_{Cap})	(psi/ (10 K · m_{Cap}))	mbar/ 10 K	(psi/ 10 K)	mbar	(psi)
Sandwich design or with flange to EN 1092-1	DN 50 without tube	59	(2.32)	0.3	(0.0043)	0.3	(0.0045)	0.3	(0.0045)	250	(3.626)
	DN 50 with tube	45	(1.89)	1.26	(0.018)	1.7	(0.025)	1.7	(0.025)	250	(3.626)
	DN 80 without tube	89	(3.50)	0.05	(0.001)	0.05	(0.001)	0.05	(0.0007)	50	(0.725)
	DN 80 with tube	72	(2.83)	0.24	(0.004)	0.17	(0.003)	0.17	(0.003)	100	(1.45)
	DN 100 without tube	89	(3.50)	0.05	(0.001)	0.07	(0.001)	0.07	(0.001)	50	(0.725)
	DN 100 with tube	89	(3.50)	0.1	(0.002)	0.07	(0.001)	0.07	(0.001)	50	(0.725)
	DN 125 without tube	124	(4.88)	0.05	(0.001)	0.03	(0.0004)	0.03	(0.0004)	20	(0.29)
	DN 125 with tube	124	(4.88)	0.05	(0.001)	0.03	(0.0004)	0.03	(0.0004)	20	(0.29)
Sandwich design with flange to ASME B16.5	2 inch without tube	59	(2.32)	0.3	(0.0043)	0.3	(0.0043)	0.3	(0.0045)	250	(3.626)
	2 inch with tube	45	(1.89)	1.26	(0.018)	1.7	(0.025)	1.7	(0.025)	250	(3.626)
	3 inch without tube	89	(3.50)	0.05	(0.001)	0.05	(0.0007)	0.05	(0.0007)	50	(0.725)
	3 inch with tube	72	(2.83)	0.24	(0.004)	0.17	(0.003)	0.17	(0.003)	100	(1.45)
	4 inch without tube	89	(3.50)	0.05	(0.001)	0.07	(0.001)	0.07	(0.001)	50	(0.725)
	4 inch with tube	89	(3.50)	0.1	(0.002)	0.07	(0.001)	0.07	(0.001)	50	(0.725)
	5 inch without tube	124	(4.88)	0.05	(0.001)	0.03	(0.0004)	0.03	(0.0004)	20	(0.29)
	5 inch with tube	124	(4.88)	0.05	(0.001)	0.03	(0.0004)	0.03	(0.0004)	20	(0.29)
Remote seal, screwed gland design	DN 50	52	(2.05)	1	(0.015)	0.83	(0.012)	0.83	(0.012)	250	(3.626)
Remote seal with union nut to DIN 11851	DN 50	52	(2.05)	1	(0.015)	0.83	(0.012)	0.83	(0.012)	250	(3.626)
	DN 65	59	(2.32)	0.7	(0.010)	0.67	(0.010)	0.67	(0.010)	250	(3.626)
	DN 80	72	(2.83)	0.24	(0.004)	0.17	(0.003)	0.17	(0.003)	100	(1.450)
Remote seal with threaded socket to DIN 11851	DN 50	52	(2.05)	1	(0.015)	0.83	(0.012)	0.83	(0.012)	250	(3.626)
	DN 65	59	(2.32)	0.7	(0.010)	0.67	(0.010)	0.67	(0.010)	250	(3.626)
	DN 80	72	(2.83)	0.24	(0.004)	0.17	(0.003)	0.17	(0.003)	100	(1.450)
Clamp connec- tion	2 inch	40	(1.57)	1	(0.015)	2.5	(0.036)	2.5	(0.036)	2000	(29.01)
	2½ inch	59	(2.32)	0.7	(0.010)	0.67	(0.010)	0.67	(0.010)	250	(3.626)
	3 inch	72	(2.83)	0.24	(0.004)	0.17	(0.003)	0.17	(0.003)	100	(1.450)

Remarks:

- Values apply for the filling liquids silicone oil M5, silicone oil M50, high-temperature oil, halocarbon oil and food oil (FDA listed).
- Values apply to stainless steel as the diaphragm material.

Temperature error Clamp-on seals

Temperature errors of clamp-on seals when connected to pressure transmitters for gauge pressure and absolute pressure, and with single-sided connection to pressure transmitters for differential pressure

Nominal diameter/ design	Temperature error of remote seal f_{RS}		Temperature error of capillary f_{Cap}		Temperature error of pro- cess flange/connection spigot f_{PF}		Recommended min. spans (guidance values, observe temperature error)	
	mbar/10 K	(psi/10 K)	mbar/10 K	(psi/10 K)	mbar/10 K	(psi/10 K)	mbar	(psi)
DN 25 (1 inch)	6.0	(0.0870)	8.5	(0.123)	8.5	(0.123)	1000	(14.5)
DN 40 (1½ inch)	4.5	(0.065)	4.5	(0.065)	4.5	(0.065)	250	(3.63)
DN 50 (2 inch)	4.0	(0.058)	3.0	(0.044)	3.0	(0.044)	100	(1.45)
DN 80 (3 inch)	9.5	(0.138)	5.0	(0.073)	5.0	(0.073)	100	(1.45)
DN 100 (4 inch)	8.0	(0.012)	3.0	(0.044)	3.0	(0.044)	100	(1.45)

Temperature errors of clamp-on seals with double-sided connection to pressure transmitters for differential pressure

Nominal diameter/ design	Temperature error of remote seal f_{RS}		Temperature error of capillary f_{Cap}		Temperature error of pro- cess flange/connection spigot f_{PF}		Recommended min. spans (guidance values, observe temperature error)	
	mbar/10 K	(psi/10 K)	mbar/10 K	(psi/10 K)	mbar/10 K	(psi/10 K)	mbar	(psi)
DN 25 (1 inch)	2.3	(0.033)	1.8	(0.026)	1.8	(0.026)	1000	(14.5)
DN 40 (1½ inch)	0.8	(0.012)	0.3	(0.004)	0.3	(0.004)	250	(3.63)
DN 50 (2 inch)	0.3	(0.004)	0.1	(0.002)	0.1	(0.002)	100	(1.45)
DN 80 (3 inch)	3.0	(0.044)	0.5	(0.007)	0.5	(0.007)	100	(1.45)
DN 100 (4 inch)	1.0	(0.015)	0.1	(0.002)	0.1	(0.002)	100	(1.45)

Remarks:

- Values apply for the filling liquids silicone oil M5, silicone oil M50, high-temperature oil, halocarbon oil and food oil (FDA listed).
- Half the values apply to glycerin/water mixture as the filling liquid.
- Values apply to stainless steel as the diaphragm material.
- Diaphragm thickness 0.05 mm (0.002 inch) for DN 25/DN 40/DN 50 and 0.1 mm (0.004 inch) for DN 80/DN 100

Pressure Measurement

Remote seals for transmitters and pressure gauges

Technical description

Calculation of the temperature error

The following equation is used to calculate the temperature error:

$$dp = (\vartheta_{RS} - \vartheta_{Cal}) \cdot f_{RS} + (\vartheta_{Cap} - \vartheta_{Cal}) \cdot l_{Cap} \cdot f_{Cap} + (\vartheta_{TR} - \vartheta_{Cal}) \cdot f_{PF}$$

dp	Additional temperature error (mbar)
ϑ_{RS}	Temperature on remote seal diaphragm (generally corresponds to temperature of medium)
ϑ_{Cal}	Calibration (reference) temperature (20 °C (68 °F))
f_{RS}	Temperature error of remote seal
ϑ_{Cap}	Ambient temperature on the capillaries
l_{Cap}	Capillary length
f_{Cap}	Temperature error of capillaries
ϑ_{TR}	Ambient temperature on pressure transmitter
f_{PF}	Temperature error of the oil filling in the process flanges of the pressure transmitter

Example of temperature error calculation

Existing conditions:

SITRANS P pressure transmitter for differential pressure, 250 mbar, set to 0 ... 100 mbar, with DN 100 remote seal diaphragms without tube, diaphragm made of stainless steel, mat. No. 1.4404/316L	$f_{RS} = 0.05 \text{ mbar}/10 \text{ K}$ (0.039 inH ₂ O/10 K)
Capillary length	$l_{Cap} = 6 \text{ m}$ (19.7 ft)
Capillaries fitted on both sides	$f_{Cap} = 0.07 \text{ mbar}/(10 \text{ K} \cdot m_{Cap})$ (0.028 inH ₂ O/(10 K · m _{Cap}))
Filling liquid silicone oil M5	$f_{PF} = 0.07 \text{ mbar}/10 \text{ K}$ (0.028 inH ₂ O/10 K)
Process temperature	$\vartheta_{RS} = 100 \text{ °C}$ (212 °F)
Temperature on the capillaries	$\vartheta_{Cap} = 50 \text{ °C}$ (122 °F)
Temperature on pressure transmitter	$\vartheta_{TR} = 50 \text{ °C}$ (122 °F)
Calibration temperature	$\vartheta_{Cal} = 20 \text{ °C}$ (68 °F)

Required:

Additional temperature error of remote seals: dp

Calculation:

in mbar
$dp = (100 \text{ °C} - 20 \text{ °C}) \cdot 0.05 \text{ mbar}/10 \text{ K} + (50 \text{ °C} - 20 \text{ °C}) \cdot 6 \text{ m} \cdot 0.07 \text{ mbar}/(10 \text{ K} \cdot \text{m}) + (50 \text{ °C} - 20 \text{ °C}) \cdot 0.07 \text{ mbar}/10 \text{ K}$
$dp = 0.4 \text{ mbar} + 1.26 \text{ mbar} + 0.21 \text{ mbar}$
in inH₂O
$dp = (212 \text{ °F} - 68 \text{ °F}) \cdot 0.039 \text{ inH}_2\text{O}/10 \text{ K} + (112 \text{ °F} - 68 \text{ °F}) \cdot 19.7 \text{ ft} \cdot 0.028 \text{ inH}_2\text{O}/(10 \text{ K} \cdot 3.28 \text{ ft}) + (112 \text{ °F} - 68 \text{ °F}) \cdot (0.028 \text{ inH}_2\text{O}/10 \text{ K})$
$dp = 0.16 \text{ inH}_2\text{O} + 0.51 \text{ inH}_2\text{O} + 0.08 \text{ inH}_2\text{O}$

Result:

dp = 1.87 mbar (0.75 inH₂O)
(corresponds to 2.27% of set span)

Note

The determined temperature error only applies to the error resulting from connection of the remote seal.

The transmission response of the respective transmitter is not included in this consideration.

It must be calculated separately, and the resulting error added to the error determined above from connection of the remote seal.

Dependence of temperature error on diaphragm material

The temperature errors listed in the previous table are based on the use of stainless steel as the diaphragm material. If other diaphragm materials are used, the temperature errors change as follows:

Diaphragm material	Change in temperature error of remote seal
	Increase in values by
Stainless steel, Duplex, ...	See previous tables
Hastelloy C4, mat. No. 2.4610	50 %
Hastelloy C276, mat. No. 2.4819	50 %
Monel 400, mat. No. 2.4360	60 %
Tantalum	50 %
Titanium	50 %
PTFE coating on stainless steel diaphragm	80 %
ECTFE coating or PFA coating on stainless steel diaphragm	100 %
Gold coating on stainless steel diaphragm	40 %
Inconel	50 %
Incoloy	50 %

Maximum temperature of medium

The following maximum temperatures of the medium apply depending on the material of the wetted parts:

Material	P _{abs} < 1 bar (402 inH ₂ O)		P _{abs} > 1 bar (402 inH ₂ O)	
	°C	(°F)	°C	(°F)
Stainless steel, 316L	200	(392)	400	(662)
PTFE coating	200	(392)	260	(500)
ECTFE coating	100	(212)	150	(302)
PFA coating	200	(392)	260	(500)
Hastelloy C4, mat. No. 2.4610	200	(392)	260	(500)
Hastelloy C276, mat. No. 2.4819	200	(392)	400	(662)
Monel 400, mat. No. 2.4360	200	(392)	400	(662)
Tantalum	200	(392)	300	(572)
Duplex, mat. No. 1.4462	200	(392)	300	(572)
Titanium	100	(212)	150	(302)
Inconel	200	(392)	400	(752)
Incoloy	200	(392)	400	(752)
Gold coating	200	(392)	400	(752)

Maximum capillary length for diaphragm seals (guidance values)

Nom. diam.		Max. length of capillary			
		Diaphragm seal		Clamp-on seal	
		m	(ft)	m	(ft)
DN 25	(1 inch)	2.5	(8.2)	2.5	(8.2)
DN 32	(1¼ inch)	2.5	(8.2)	2.5	(8.2)
DN 40	(1½ inch)	4	(13.1)	6	(19.7)
DN 50	(2 inch)	6	(19.7)	10	(32.8)
DN 65	(2½ inch)	8	(26.2)	10	(32.8)
DN 80	(3 inch)	15	(49.1)	10	(32.8)
DN 100	(4 inch)	15	(49.1)	10	(32.8)
DN 125	(5 inch)	15	(49.1)	-	-

Pressure Measurement

Remote seals for transmitters and pressure gauges

Technical description

1

Response times

The values listed in the following table are the response times (in seconds per meter of capillary) for a change in pressure which corresponds to the set span.

The listed values must be multiplied by the respective length of the capillary, or with transmitters for differential pressure and flow by the total length of both capillaries.

The response times are independent of the set span within the range of the respective transmitter. The response times are of insignificant importance for spans above 10 bar (145 psi). The response times of the pressure transmitters are not considered in the table.

Filling liquid	Density		Temperature on capillary		Response time in s/m (s/ft) with max. span of pressure transmitter					
	kg/dm ³	(lb/in ³)	°C	(°F)	250 mbar	(101 inH ₂ O)	600 mbar	(241 inH ₂ O)	1600 mbar	(643 inH ₂ O)
Silicone oil M5	0.914	(0.033)	+60	(140)	0.06	(0.018)	0.02	(0.006)	0.01	(0.003)
			+20	(68)	0.11	(0.034)	0.02	(0.006)	0.02	(0.006)
			-20	(-4)	0.3	(0.091)	0.12	(0.037)	0.05	(0.015)
Silicone oil M50	0.966	(0.035)	+60	(140)	0.6	(0.183)	0.25	(0.076)	0.09	(0.027)
			+20	(68)	0.61	(0.186)	0.26	(0.079)	0.1	(0.030)
			-20	(-4)	1.69	(0.515)	0.71	(0.216)	0.27	(0.082)
High-temperature oil	1.070	(0.039)	+60	(140)	0.14	(0.043)	0.06	(0.018)	0.02	(0.006)
			+20	(68)	0.65	(0.198)	0.27	(0.082)	0.1	(0.030)
			-10	(14)	3.96	(1.207)	1.65	(0.503)	0.62	(0.189)
Halocarbon oil	1.968	(0.071)	+60	(140)	0.07	(0.021)	0.03	(0.009)	0.01	(0.003)
			+20	(68)	0.29	(0.088)	0.12	(0.037)	0.05	(0.015)
			-20	(-4)	2.88	(0.878)	1.2	(0.366)	0.45	(0.137)
Food oil (FDA listed)	0.920	(0.033)	+60	(140)	0.75	(0.229)	0.33	(0.101)	0.17	(0.052)
			+20	(68)	4	(1.220)	1.75	(0.534)	0.67	(0.204)
			-20	(-4)	20	(6.100)	8.5	(2.593)	3.25	(0.991)

Technical data of filling liquids

When selecting the filling liquid, check that it is suitable with respect to the permissible temperature of the medium and the process pressure.

Also check the compatibility of the filling liquid with the measured medium. For example, only physiologically harmless filling liquids may be used in the food industry.

Oxygen and chlorine are special cases of measured medium. The liquid must not react with either of these two media or a leaking remote seal may lead to an explosion or fire.

Halocarbon oil must be used as the fill fluid with the media oxygen and chlorine.

Filling liquid	Digit in Article No.	Permissible temperature of medium				Density at 20 °C (68 °F)		Viscosity at 20 °C (68 °F)		Coefficient of expansion	
		$P_{abs} < 1 \text{ bar}$		$P_{abs} > 1 \text{ bar}$		kg/dm ³	(lb/in ³)	m ² /s·10 ⁶	(ft ² /s·10 ⁶)	1/°C	(1/°F)
		°C	(°F)	°C	(°F)						
Silicone oil M5	1	-60 ... +80	(-76 ... +176)	-90 ... +180	(-130 ... +356)	0.914	(0.03)	4	(43)	0.00108	(0.00060)
Silicone oil M50	2	-40 ... +150	(-40 ... +302)	-40 ... +250	(-40 ... +482)	0.96	(0.03)	50	(538)	0.00104	(0.00058)
High-temperature oil	3	-10 ... +200	(+14 ... +392)	-20 ... +400	(-4 ... +752)	1.07	(0.04)	57	(613)	0.00080	(0.00044)
Halocarbon oil	4 ¹⁾	-40 ... +80	(-40 ... +176)	-40 ... +175	(-40 ... +347)	1.968	(0.07)	14	(151)	0.00086	(0.00048)
Food oil (FDA listed)	7	-20 ... +160	(-4 ... +320)	-20 ... +200	(-4 ... +392)	0.92	(0.03)	10	(107)	0.00080	(0.00044)

¹⁾ Max. pressure and temperature for oxygen measurements: 50 bar (725 psi) and 60° (140 °F).

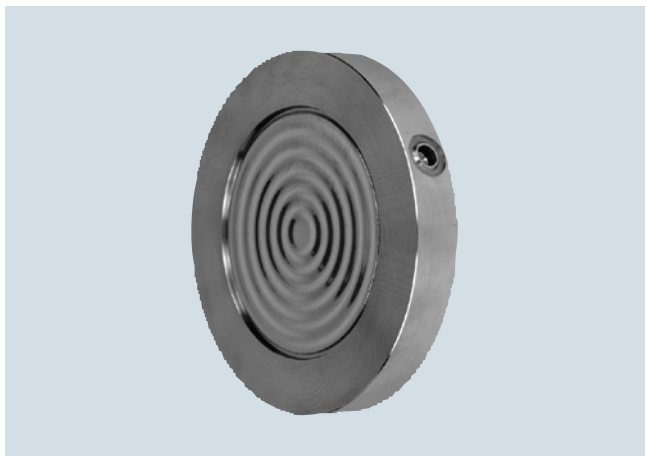
Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of sandwich design with flexible capillary

1

Overview



Diaphragm seals of sandwich design

Technical specifications

Diaphragm seals of sandwich design

Nominal diameter	Nominal pressure
• DN 50	PN 16 ... PN 400
• DN 80	PN 16 ... PN 400
• DN 100	PN 16 ... PN 400
• DN 125	PN 16 ... PN 400
• 2 inch	Class 150 ... class 2500
• 3 inch	Class 150 ... class 2500
• 4 inch	Class 150 ... class 2500
• 5 inch	Class 150 ... class 2500
Sealing face	
• For stainless steel, mat. No. 1.4404/316L	To EN 1092-1, form B1 or ASME B16.5 RF 125 ... 250 AA
• For the other materials	To EN 1092-1, form B2 or ASME B16.5 RFSF
Materials	
• Main body	Stainless steel mat. no. 1.4404/316L
• Wetted parts	Stainless steel mat. no. 1.4404/316L
	<ul style="list-style-type: none"> • Without coating • PTFE coating (for vacuum on request) • ECTFE coating (for vacuum on request) • PFA coating (for vacuum on request)
	Monel 400, mat. No. 2.4360
	Hastelloy C276, mat. No. 2.4819
	Hastelloy C4, mat. No. 2.4610
	Tantalum
	Duplex 2205, mat. no. 1.4462
	Stainless steel 316L, gold plated, thickness approx. 25 µm
• Capillary	Stainless steel, mat. No. 1.4571/316Ti
• Sheath	Spiral hose made of stainless steel, mat. No. 1.4301/316

Sealing material in the process flanges	
• For pressure transmitters, absolute pressure transmitters and low-pressure applications	Copper
• For other applications	Viton
Maximum pressure	See above and the technical data of the pressure transmitters
Tube length	Without tube as standard (tube available on request)
Capillary	
• Length	Max. 10 m (32.8 ft), longer lengths on request
• Internal diameter	max. 2 mm (0.079 inch)
• Minimum bending radius	150 mm (5.9 inch)
Filling liquid	Silicone oil M5 Silicone oil M50 High-temperature oil Halocarbon oil (for measuring O ₂) Food oil (FDA listed)
Permissible ambient temperature	Dependent on the pressure transmitter and the filling liquid of the remote seal More information can be found in the technical data of the pressure transmitters and in the section "Technical data of filling liquid" in the Technical description to the remote seals
Weight	Approx. 4 kg (8.82 lb)

Certificate and approvals

Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
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Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of sandwich design with flexible capillary

1

Selection and Ordering data	Article No.	Ord.code
Diaphragm seal Sandwich-type design, with flexible capillary connected to a SITRANS P transmitter (order separately):		
for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-... ¹⁾ ; Scope of delivery (1 off)	7MF4900-	
for absolute pressure 7MF433.-...; Scope of delivery (1 off)	7MF4901-	
for differential pressure and flow 7MF443.-... and 7MF54.-...; scope of delivery 2 off	7MF4903-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	1	B
Nominal diameter and nominal pressure • DN 50 PN 16 ... 400 (recommended only for pressure transmitters for pressure) • DN 80 PN 16 ... 400 • DN 100 PN 16 ... 400 • DN 125 PN 16 ... 400 • 2 inch Class 150 ... 2500 (recommended only for pressure transmitters for pressure) • 3 inch Class 150 ... 2500 • 4 inch Class 150 ... 2500 • 5 inch Class 150 ... 2500 Smooth sealing face to EN 1092-1, form B1 or to ASME B16.5 RF 125 ... 250 AA Other version Add Order code and plain text: Nominal diameter: ...; Nominal pressure: ... Sealing face: see "Technical data"	A B C D E H L N Z	J 1 Y
Wetted parts materials • Stainless steel 316L - without coating - with PTFE coating ²⁾ - with ECTFE coating ^{2) 3)} - with PFA coating ²⁾ • Monel 400, mat. No. 2.4360 • Hastelloy C276, mat. No. 2.4819 • Hastelloy C4, mat. No. 2.4610 • Tantalum • Duplex 2205, mat. no. 1.4462 • Duplex 2205, mat. no. 1.4462, incl. main body • Stainless steel 316L, gold plated, thickness approx. 25 µm Other version Add Order code and plain text: Wetted parts materials: ...	A E 0 F D G J U K Q R S 0 Z	K 1 Y
Tube length • without tube Other version: Add Order code and plain text: Tube length: ...	0 9	L 1 Y
Filling liquid • Silicone oil M5 • Silicone oil M50 • High-temperature oil • Halocarbon oil (for measuring O ₂) ⁴⁾ • Food oil (FDA listed) Other version Add Order code and plain text: Filling liquid: ...	1 2 3 4 7 9	M 1 Y
	1	B

Selection and Ordering data	Article No.	Ord.code
Diaphragm seal Sandwich-type design, with flexible capillary connected to a SITRANS P transmitter (order separately):		
for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-... ¹⁾ ; Scope of delivery (1 off)	7MF4900-	
for absolute pressure 7MF433.-...; Scope of delivery (1 off)	7MF4901-	
for differential pressure and flow 7MF443.-... and 7MF54.-...; scope of delivery 2 off	7MF4903-	
Length of capillary ⁵⁾		
• 1.0 m (3.28 ft)	2	
• 1.6 m (5.25 ft)	3	
• 2.5 m (8.20 ft)	4	
• 4.0 m (13.1 ft)	5	
• 6.0 m (19.7 ft)	6	
• 8.0 m (26.25 ft)	7	
• 10.0 m (32.8 ft)	8	
Special lengths for capillaries		
• 2.0 m	9	N 1 C
• 3.0 m	9	N 1 E
• 5.0 m	9	N 1 G
• 7.0 m	9	N 1 J
• 9.0 m	9	N 1 L
<u>only for 7MF4903-...</u>		
• 11.0 m	9	N 1 N
• 12.0 m	9	N 1 P
• 13.0 m	9	N 1 Q
• 14.0 m	9	N 1 R
• 15.0 m	9	N 1 S

¹⁾ With 7MF802.-... and the measuring cells Q, S, T and U also order the vacuum-tight version.

²⁾ Only possible up to max. PN 100.

³⁾ For vacuum on request

⁴⁾ Oil- and grease- free cleaning to DIN 25410, level 2 and packaging included in the scope of delivery.

⁵⁾ Max. capillary length, see section "Technical description".

Pressure Measurement

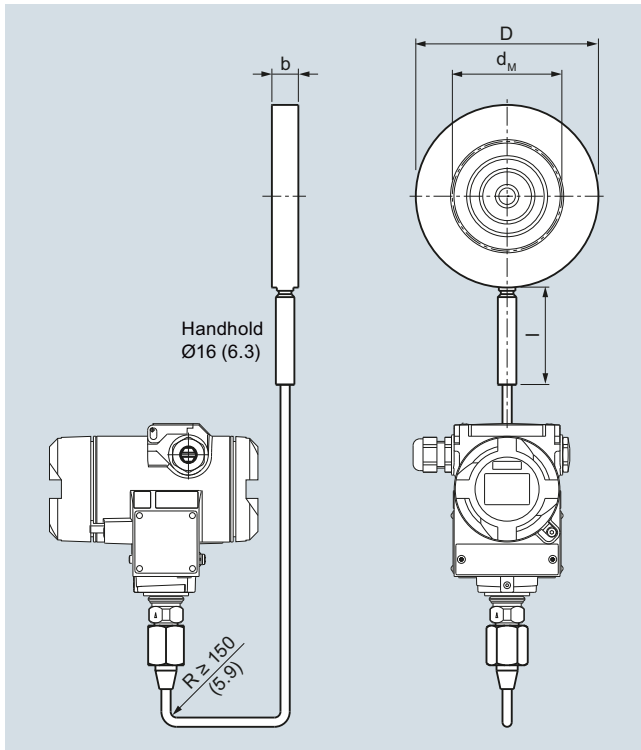
Remote seals for transmitters and pressure gauges

Diaphragm seals of sandwich design with flexible capillary

1

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Further designs	
Please add "-Z" to Article No. and specify Order code.		Please add "-Z" to Article No. and specify Order code.	
Spark arrestor		Sealing surface B1 or ASME B16.5 RF 125 ... 250 AA	J12
With spark arrestor for mounting on zone 0 (including documentation)		instead of sealing surface B2 or RFSF (only for wetted parts made of Hastelloy C276 (2.4819), tantalum and Duplex 2205 (1.4462) and for nominal sizes 2", 3", DN 50 and DN 80)	
• Pressure and absolute pressure	A01		
• for differential pressure transmitters	A02		
Remote seal nameplate	B20	Sealing surface groove, EN 1092-1, form D	J14
Attached out of stainless steel, contains Article No. and order number of the remote seal supplier		instead of sealing surface B1 (only for wetted parts made of stainless steel 316L)	
Oil- and grease-free cleaned version	C10	Sealing surface RJF (groove) ASME B16.5	J24
Oil- and grease-free cleaned and packed version, <u>not for oxygen application</u> , only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2		instead of sealing surface ASME B16.5 RF 125 ... 250 AA (only for wetted parts made of stainless steel 316L)	
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	PE protective tube	
Inspection certificate	C12	over the spiral protective tube (color: white) of the capillaries	
to EN 10204, section 3.1		1.0 m	N20
2.2 Certificate of FDA approval of fill oil	C17	1.6 m	N21
Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"		2.0 m	N22
Functional safety certificate ("SIL 2") to IEC 61508	C20	2.5 m	N23
(Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)		3.0 m	N24
Functional safety certificate ("SIL 2/3") to IEC 61508	C23	4.0 m	N25
(Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)		5.0 m	N26
Certification acc. to NACE MR-0175	D07	6.0 m	N27
Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)		7.0 m	N28
Certification acc. to NACE MR-0103	D08	8.0 m	N29
Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)		9.0 m	N30
Oil- and grease-free cleaned version	E10	10.0 m	N31
Oil- and grease-free cleaned and packed version, <u>only for oxygen application</u> , only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2		<u>only for 7MF4903-...</u>	
Epoxy painting	E15	11.0 m	N32
(not possible with vacuum-proof design and not for 7MF4901-...)		12.0 m	N33
Color: transparent, coverage: front and rear of the remote seal, capillary(ies) or connecting tube, process connection of the transmitter. With transmitters 7MF40.. and 7MF42..., only possible with process connection G½B according to EN837-1		13.0 m	N34
		14.0 m	N35
		15.0 m	N36
		Vacuum-proof design	
		for use in low-pressure range for transmitters for	
		• Gauge and absolute pressure from the pressure series	V01
		• Differential pressure transmitters	V03

Dimensional drawings



Diaphragm seals of sandwich design with flexible capillary for connection to SITRANS P pressure transmitters for pressure, dimensions in mm (inch)

Connection to EN 1092-1

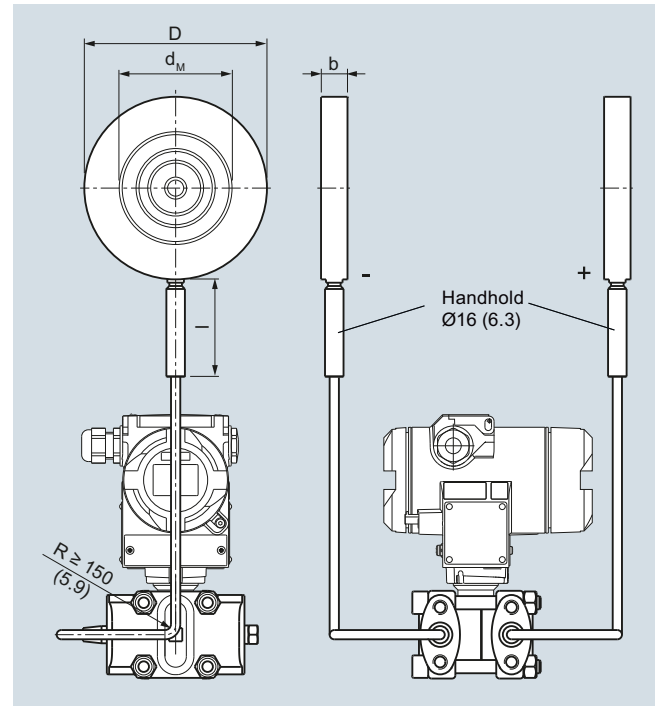
Nom. diam.	Nom. press.	b	D	d _M	l
		mm	mm	mm	mm
DN 50	PN 16 ... PN 400	20	102	59	100
DN 80		20	138	89	100
DN 100		20	158	89	100
DN 125		22	188	124	100

Connection to ASME B16.5

Nom. diam.	Nom. press.	b	D	d _M	l
	lb/sq.in.	mm (inch)	mm (inch)	mm (inch)	mm (inch)
2 inch	150 ... 2500	20 (0.79)	100 (3.94)	59 (2.32)	100 (3.94)
3 inch		20 (0.79)	134 (5.28)	89 (2.32)	100 (3.94)
4 inch		20 (0.79)	158 (6.22)	89 (2.32)	100 (3.94)
5 inch		22 (0.87)	186 (7.32)	124 (4.88)	100 (3.94)

d: Inside diameter of gasket according to EN 1092-1 / ASME B16.5

d_M: Effective diaphragm diameter



Diaphragm seals of sandwich design (without flange) with flexible capillary for connection to SITRANS P pressure transmitters for absolute pressure or differential pressure and flow, dimensions in mm (inch)

Connection to EN 1092-1

Nom. diam.	Nom. press.	b	D	d _M	l
		mm	mm	mm	mm
DN 50	PN 16 ... PN 400	20	102	59	100
DN 80		20	138	89	100
DN 100		20	158	89	100
DN 125		22	188	124	100

Connection to ASME B16.5

Nom. diam.	Nom. press.	b	D	d _M	l
	lb/sq.in.	mm (inch)	mm (inch)	mm (inch)	mm (inch)
2 inch	150 ... 2500	20 (0.79)	100 (3.94)	59 (2.32)	100 (3.94)
3 inch		20 (0.79)	134 (5.28)	89 (2.32)	100 (3.94)
4 inch		20 (0.79)	158 (6.22)	89 (2.32)	100 (3.94)
5 inch		22 (0.87)	186 (7.32)	124 (4.88)	100 (3.94)

d: Inside diameter of gasket according to EN 1092-1 / ASME B16.5

d_M: Effective diaphragm diameter

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design with flexible capillary

1

Overview



Diaphragm seals of flange design

Technical specifications

Diaphragm seals of flange design with flexible capillary

Nominal diameter	Nominal pressure
<ul style="list-style-type: none"> • DN 50 (recommendable only for pressure transmitters for pressure) • DN 80 • DN 100 • DN 125 • 2 inch (recommendable only for pressure transmitters for pressure) • 3 inch • 4 inch • 5 inch 	PN 10/16/25/40, PN 100 PN 10/16/25/40, PN 100 PN 10/16, PN 25/40 PN 16, PN 40 class 150, class 300, class 400/600, class 900/1500 Class 150, class 300, class 600 Class 150, class 300, class 400 Class 150, class 300, class 400
Sealing face	
<ul style="list-style-type: none"> • For stainless steel, mat. No. 1.4404/316L • For the other materials 	To EN 1092-1, form B1 or ASMR B16.5 RF 125 ... 250 AA To EN 1092-1, form B2 or ASME B16.5 RFSF
Materials	
<ul style="list-style-type: none"> • Main body • Wetted parts 	Stainless steel mat. no. 1.4404/316L Stainless steel mat. no. 1.4404/316L <ul style="list-style-type: none"> • Without coating • PTFE coating (for vacuum on request) • ECTFE coating (for vacuum on request) • PFA coating (for vacuum on request) Monel 400, mat. No. 2.4360 Hastelloy C276, mat. No. 2.4819 Hastelloy C4, mat. No. 2.4610 Tantalum Duplex 2205, mat. no. 1.4462 Stainless steel 316L, gold plated, thickness approx. 25 µm
<ul style="list-style-type: none"> • Capillary • Sheath 	Stainless steel, mat. No. 1.4571/316Ti Spiral hose made of stainless steel, mat. No. 1.4404/316L

Sealing material in the process flanges	
<ul style="list-style-type: none"> • For pressure transmitters, absolute pressure transmitters and low-pressure applications • For other applications 	Copper Viton
Maximum pressure	See above and the technical data of the pressure transmitter
Tube length	Without tube as standard (tube available on request)
Capillary	
<ul style="list-style-type: none"> • Length 	Max. 10 m (32.8 ft), longer lengths on request
<ul style="list-style-type: none"> • Internal diameter • Minimum bending radius 	2 mm (0.079 inch) 150 mm (5.9 inch)
Filling liquid	
(for remote seals of sandwich and flange design)	Silicone oil M5
	Silicone oil M50
	High-temperature oil
	Halocarbon oil (for measuring O ₂)
	Food oil (FDA listed)
Permissible ambient temperature	Dependent on the pressure transmitter and the filling liquid of the remote seal More information can be found in the technical data of the pressure transmitters and in the section "Technical data of filling liquid" in the Technical description to the remote seals
Weight	Approx. 4 kg (8.82 lb)

Certificate and approvals

Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
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Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design with flexible capillary

1

Selection and Ordering data	Article No.	Ord. code
Diaphragm seal		
Flange design, with flexible capillary, connected to a pressure transmitter SITRANS P (order separately):		
for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-... ¹⁾ ; scope of delivery: 1 off	7 MF 4 9 2 0 -	
for absolute pressure 7MF433.-...; scope of delivery: 1 off	7 MF 4 9 2 1 -	
for differential pressure and flow 7MF443.-... and 7MF54.-...; scope of delivery: 2 off	7 MF 4 9 2 3 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	1 ■■■■ - ■ B ■■■■	
Nominal diameter and nominal pressure		
• DN 50 PN 10/16/25/40 PN 100 (DN 50 recommended only for pressure transmitters for pressure)	A B	
• DN 80 PN 10/16/25/40 PN 100	D E	
• DN 100 PN 10/16 PN 25/40	G H	
• DN 125 PN 16 PN 40	J K	
• 2 inch Class 150 Class 300 class 400/600 class 900/1500 (2 inch recommended only for pressure transmitters for pressure)	L M N P	
• 3 inch Class 150 Class 300 Class 600	Q R S	
• 4 inch Class 150 Class 300 Class 400	T U V	
• 5 inch Class 150 Class 300 Class 400	W X Y	
Smooth sealing face to EN 1092-1, form B1 or to ASME B16.5 RF 125 ... 250 AA	Z	J 1 Y
Other version Add Order code and plain text: Nominal diameter: ...; Nominal pressure: ... Sealing face: See "Technical data"		
Wetted parts materials		
• Stainless steel 316L - without coating - with PTFE coating - with ECTFE coating ²⁾ - with PFA coating	A E 0 F D	
• Monel 400, mat. No. 2.4360	G	
• Hastelloy C276, mat. No. 2.4819	J	
• Hastelloy C4, mat. No. 2.4610	U	
• Tantalum	K	
• Duplex 2205, mat. no. 1.4462	Q	
• Duplex 2205, mat. no. 1.4462, incl. main body	R	
• Stainless steel 316L, gold plated, thickness approx. 25 µm	S 0	
Other version Add Order code and plain text: Wetted parts materials: ...	Z	K 1 Y
Tube length		
• without tube	0	
Other version: Add Order code and plain text: Tube length: ...	9	L 1 Y

Selection and Ordering data	Article No.	Ord. code
Diaphragm seal		
Flange design, with flexible capillary, connected to a pressure transmitter SITRANS P (order separately):		
for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-... ¹⁾ ; scope of delivery: 1 off	7 MF 4 9 2 0 -	
for absolute pressure 7MF433.-...; scope of delivery: 1 off	7 MF 4 9 2 1 -	
for differential pressure and flow 7MF443.-... and 7MF54.-...; scope of delivery: 2 off	7 MF 4 9 2 3 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	1 ■■■■ - ■ B ■■■■	
Filling liquid		
• Silicone oil M5	1	
• Silicone oil M50	2	
• High-temperature oil	3	
• Halocarbon oil (for measuring O ₂) ³⁾	4	
• Food oil (FDA listed)	7	
Other version Add Order code and plain text: Filling liquid: ...	9	M 1 Y
Length of capillary⁴⁾		
• 1.0 m (3.28 ft)	2	
• 1.6 m (5.25 ft)	3	
• 2.5 m (8.20 ft)	4	
• 4.0 m (13.1 ft)	5	
• 6.0 m (19.7 ft)	6	
• 8.0 m (26.25 ft)	7	
• 10.0 m (32.8 ft)	8	
Special lengths for capillaries		
• 2.0 m	9	N 1 C
• 3.0 m	9	N 1 E
• 5.0 m	9	N 1 G
• 7.0 m	9	N 1 J
• 9.0 m	9	N 1 L
<u>only for 7MF4923-...</u>		
• 11.0 m	9	N 1 N
• 12.0 m	9	N 1 P
• 13.0 m	9	N 1 Q
• 14.0 m	9	N 1 R
• 15.0 m	9	N 1 S

1) With 7MF802.-... and the measuring cells Q, S, T and U also order the vacuum-tight version.
 2) For vacuum on request.
 3) Oil- and grease- free cleaning to DIN 25410, level 2 and packaging included in the scope of delivery.
 4) Max. capillary length, see section "Technical description".

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design with flexible capillary

1

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code.		Further designs Please add "-Z" to Article No. and specify Order code.	
Spark arrestor With spark arrestor for mounting on zone 0 (including documentation) for transmitters for <ul style="list-style-type: none"> • pressure and absolute pressure • differential pressure 	A01 A02	Sealing surface B1 or ASME B16.5 RF 125 ... 250 AA instead of sealing surface B2 or RFSF (only for wetted parts made of Hastelloy C276 (2.4819), tantalum and Duplex 2205 (1.4462) and for nominal sizes 2", 3", DN 50 and DN 80)	J12
Remote seal nameplate Attached out of stainless steel, contains MLFB and order number of the remote seal	B20	Sealing surface groove, EN 1092-1, form D instead of sealing surface B1 (only for wetted parts made of stainless steel 316L)	J14
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, <u>not for oxygen application</u> , only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2	C10	Sealing surface RJF (groove) ASME B16.5 instead of sealing surface ASME B16.5 RF 125 ... 250 AA (only for wetted parts made of stainless steel 316L)	J24
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	PE protective tube over the spiral protective tube (color: white) of the capillaries	
Inspection certificate to EN 10204, section 3.1	C12	1.0 m	N20
2.2 Certificate of FDA approval of fill oil Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"	C17	1.6 m	N21
Functional safety certificate ("SIL 2") to IEC 61508 (Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)	C20	2.0 m	N22
Functional safety certificate ("SIL 2/3") to IEC 61508 (Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)	C23	2.5 m	N23
Certification acc. to NACE MR-0175 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D07	3.0 m	N24
Certification acc. to NACE MR-0103 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D08	4.0 m	N25
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, <u>only for oxygen application</u> , only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2	E10	5.0 m	N26
Epoxy painting (not possible with vacuum-proof design and not for 7MF4921-...) Color: transparent, coverage: front and rear of the remote seal, capillary(ies) or connecting tube, process connection of the transmitter. With transmitters 7MF40.. and 7MF42..., only possible with process connection G½B according to EN837-1.	E15	6.0 m	N27
		7.0 m	N28
		8.0 m	N29
		9.0 m	N30
		10.0 m	N31
		<u>only for 7MF4923-...</u>	
		11.0 m	N32
		12.0 m	N33
		13.0 m	N34
		14.0 m	N35
		15.0 m	N36
		Vacuum-proof design for use in low-pressure range for transmitters for <ul style="list-style-type: none"> • Gauge and absolute pressure from the pressure series • Differential pressure 	V01 V03

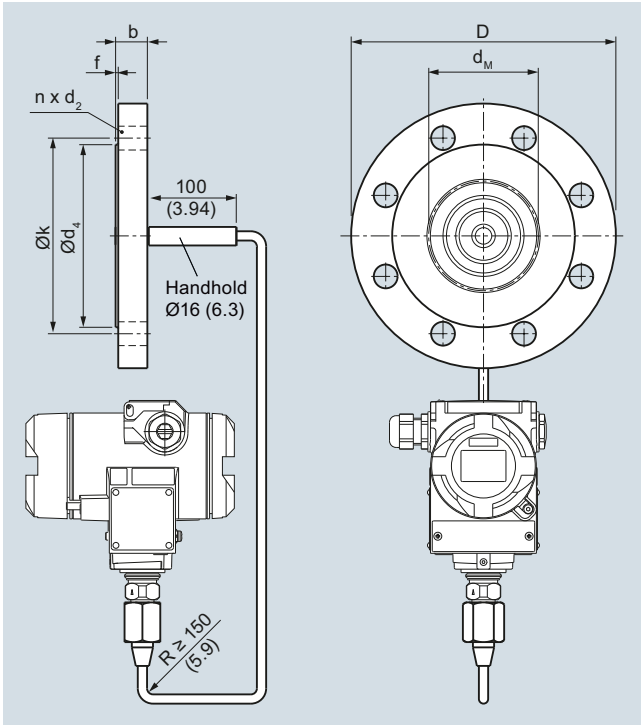
Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design with flexible capillary

1

Dimensional drawings



Diaphragm seals of flange design with flexible capillary for connection to SITRANS P pressure transmitters for pressure, dimensions in mm (inch)

Connection to EN 1092-1

Nom. diam.	Nom. press.	b mm	D mm	d ₂ mm	d ₄ mm	d _M mm	f mm	k mm	n
DN 50	PN 10/16/25/40	20	165	18	102	59	2	125	4
	PN 100	28	195	26	102	59	2	145	4
DN 80	PN 10/16/	24	200	18	138	89	2	160	8
	PN 100	32	230	26	138	89	2	180	8
DN 100	PN 10/16	20	220	18	158	89	2	180	8
	PN 25/40	24	235	22	162	89	2	190	8
DN 125	PN 16	22	250	18	188	124	2	210	8
	PN 40	26	270	26	188	124	2	220	8

Connection to ASME B16.5

Nom. diam.	Nom. press.	b mm	D mm	d ₂ mm	d ₄ mm	d _M mm	f mm	k mm	n
	lb/sq.in.	mm	mm	mm	mm	mm	mm	mm	
		(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	
2 inch	150	19.5 (0.77)	150 (5.80)	20 (0.79)	92 (3.62)	59 (2.32)	2 (0.08)	120.5 (4.74)	4
	300	22.7 (0.89)	165 (6.50)	20 (0.79)	92 (3.62)	59 (2.32)	2 (0.08)	127 (5)	8
	400/600	32.4 (1.28)	165 (6.50)	20 (0.79)	92 (3.62)	59 (2.32)	2 (0.08)	127 (5)	8
	900/1500	45.1 (1.78)	215 (8.46)	26 (1.02)	92 (3.62)	59 (2.32)	7 (0.28)	165 (6.5)	8
3 inch	150	24.3 (0.96)	190 (7.48)	20 (0.79)	127 (5)	89 (3.50)	2 (0.08)	152.5 (6)	4
	300	29 (1.14)	210 (8.27)	22 (0.87)	127 (5)	89 (3.50)	2 (0.08)	168.5 (6.63)	8
	600	38.8 (1.53)	210 (8.27)	22 (0.87)	127 (5)	89 (3.50)	7 (0.28)	168.5 (6.63)	8
4 inch	150	24.3 (0.96)	230 (9.06)	20 (0.79)	158 (6.22)	89 (3.50)	2 (0.08)	190.5 (7.5)	4
	300	32.2 (1.27)	255 (10.04)	22 (0.87)	158 (6.22)	89 (3.50)	2 (0.08)	200 (7.87)	8
	400	42 (1.65)	255 (10.04)	26 (1.02)	158 (6.22)	89 (3.50)	7 (0.28)	200 (7.87)	8
5 inch	150	24.3 (0.96)	255 (10.04)	22 (0.87)	186 (7.32)	124 (4.88)	2 (0.08)	216 (8.50)	4
	300	35.8 (1.41)	280 (11.02)	22 (0.87)	186 (7.32)	124 (4.88)	2 (0.08)	235 (9.25)	8
	400	45.1 (1.79)	280 (11.02)	26 (1.02)	186 (7.32)	124 (4.88)	7 (0.28)	235 (9.25)	8

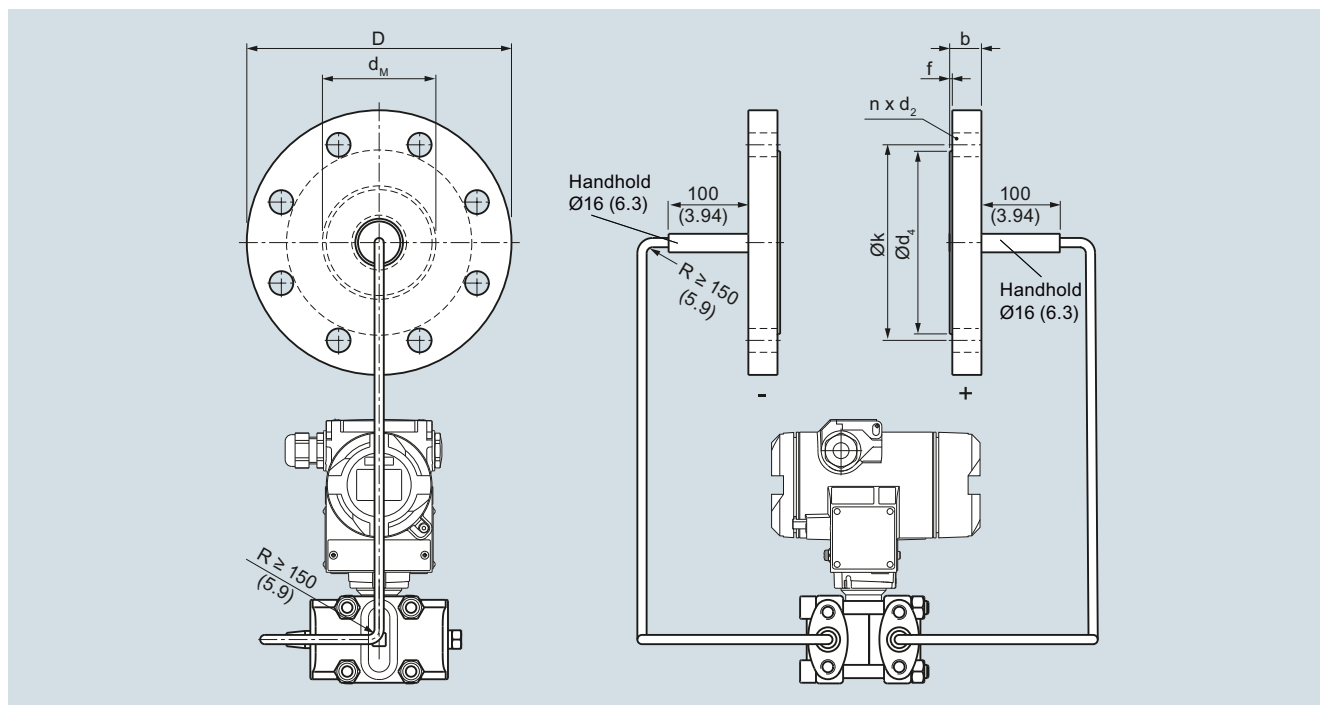
d: Inside diameter of gasket according to EN 1092-1 / ASME B16.5
d_M: Effective diaphragm diameter

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design with flexible capillary

1



Diaphragm seals of flange design with flexible capillary for connection to SITRANS P pressure transmitters for absolute pressure or for differential pressure and flow, dimensions in mm (inch)

Connection to EN 1092-1

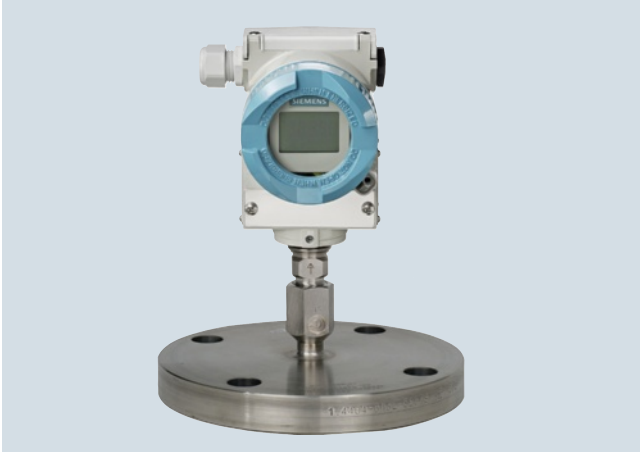
Nom. diam.	Nom. press.	b mm	D mm	d ₂ mm	d ₄ mm	d _M mm	f mm	k mm	n
DN 80	PN 10/16	24	200	18	138	89	2	160	8
	PN 100	32	230	26	138	89	2	180	8
DN 100	PN 10/16	20	220	18	158	89	2	180	8
	PN 25/40	24	235	22	162	89	2	190	8
DN 125	PN 16	22	250	18	188	124	2	210	8
	PN 40	26	270	26	188	124	2	220	8

Connection to ASME B16.5

Nom. diam.	Nom. press.	b	D	d ₂	d ₄	d _M	f	k	n
		lb/sq.in mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	
3 inch	150	24.3 (0.96)	190 (7.48)	20 (0.79)	127 (5)	89 (3.50)	2 (0.08)	152.5 (6)	4
	300	29 (1.14)	210 (8.27)	22 (0.87)	127 (5)	89 (3.50)	2 (0.08)	168.5 (6.63)	8
	600	38.8 (1.52)	210 (8.27)	22 (0.87)	127 (5)	89 (3.50)	7 (0.28)	168.5 (6.63)	8
4 inch	150	24.3 (0.96)	230 (9.06)	20 (0.79)	158 (6.22)	89 (3.50)	2 (0.08)	190.5 (7.5)	4
	300	32.2 (1.27)	255 (10.04)	22 (0.87)	158 (6.22)	89 (3.50)	2 (0.08)	200 (7.87)	8
	400	42 (1.65)	255 (10.04)	26 (1.02)	158 (6.22)	89 (3.50)	7 (0.28)	200 (7.87)	8
5 inch	150	24.3 (0.96)	255 (10.04)	22 (0.87)	186 (7.32)	124 (4.88)	2 (0.08)	216 (8.50)	4
	300	35.8 (1.41)	280 (11.02)	22 (0.87)	186 (7.32)	124 (4.88)	2 (0.08)	235 (9.25)	8
	400	45.1 (1.79)	280 (11.02)	26 (1.02)	186 (7.32)	124 (4.88)	7 (0.28)	235 (9.25)	8

d: Inside diameter of gasket according to EN 1092-1 / ASME B16.5
d_M: Effective diaphragm diameter

Overview



Diaphragm seals of flange design, directly fitted on a pressure transmitter for pressure

Technical specifications

Diaphragm seals (flange design) for pressure and absolute pressure, directly fitted on a transmitter

Nominal diameter	Nominal pressure
• DN 50	PN 10/16/25/40, PN 100
• DN 80	PN 10/16/25/40, PN 100
• DN 100	PN 10/16, PN 25/40
• 2 inch	class 150, class 300, class 400/600, class 900/1500
• 3 inch	Class 150, class 300, class 600
• 4 inch	Class 150, class 300, class 400
Sealing face	
• For stainless steel, mat. No. 1.4404/316L	To EN 1092-1, form B1 or ASME B16.5 RF 125 ... 250 AA
• For the other materials	Smooth to EN 1092-1, form B2 or ASME B16.5 RFSF
Materials	
• Main body	Stainless steel mat. no. 1.4404/316L
• Wetted parts	Stainless steel mat. no. 1.4404/316L
	<ul style="list-style-type: none"> • Without coating • PTFE coating (for vacuum on request) • ECTFE coating (for vacuum on request) • PFA coating (for vacuum on request)
	Monel 400, mat. No. 2.4360
	Hastelloy C276, mat. No. 2.4819
	Hastelloy C4, mat. No. 2.4610
	Tantalum
	Duplex 2205, mat. no. 1.4462
	Stainless steel 316L, gold plated, thickness approx. 25 µm
• Capillary	Stainless steel, 1.4571/316Ti
• Sealing material at the transmitter connection	Copper

Maximum pressure	See above and the technical data of the transmitter
Tube length	<ul style="list-style-type: none"> • Without tube • 50 mm (1.97 inch) • 100 mm (3.94 inch) • 150 mm (5.91 inch) • 200 mm (7.87 inch)
Capillary	
• Length	Max. 10 m (32.8 ft), longer lengths on request
• Internal diameter	2 mm (0.079 inch)
• Minimum bending radius	150 mm (5.9 inch)
Filling liquid	<ul style="list-style-type: none"> • Silicone oil M5 • Silicone oil M50 • High-temperature oil • Halocarbon oil (for measuring O₂) • Food oil (FDA listed)
Max. recommended process temperature	170 °C (338 °F)
Permissible ambient temperature	Dependent on the pressure transmitter and the filling liquid of the remote seal. More information can be found in the technical data of the pressure transmitters and in the section "Technical data of filling liquid" in the Technical description to the remote seals.
Weight	Approx. 4 kg (8.82 lb)

Certificate and approvals

Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
--	--

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design directly fitted on transmitter

1

Selection and Ordering data

Article No. Ord.code

Diaphragm seal

7MF4910-

Directly fitted to a pressure transmitter SITRANS P for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-...¹⁾; must be ordered separately

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process connection

- Vertical (pressure transmitter upright)
- Horizontal

0

2

Nominal diameter and nominal pressure

- DN 50 PN 10/16/25/40
PN 100
- DN 80 PN 10/16/25/40
PN 100
- DN 100 PN 10/16
PN 25/40
- 2 inch Class 150
Class 300
class 400/600
class 900/1500
- 3 inch Class 150
Class 300
Class 600
- 4 inch Class 150
Class 300
Class 400

A

B

D

E

G

H

L

M

N

P

Q

R

S

T

U

V

Smooth sealing face to DIN 1092-01, form B1 or B2, or to ASME B16.5 125 ... 250 AA or RFSF

Other version

Add Order code and plain text:

Nominal diameter: ...; Nominal pressure: ...

Z

J 1 Y

Wetted parts materials

- Stainless steel 316L
 - without coating
 - with PTFE coating
 - with ECTFE coating²⁾
 - with PFA coating
- Monel 400, mat. No. 2.4360
- Hastelloy C276, mat. No. 2.4819
- Hastelloy C4, mat. No. 2.4610
- Tantalum
- Duplex 2205, W.-Nr. 1.4462
- Stainless steel 316L, gold plated, thickness approx. 25 µm

A

E

O

F

D

G

J

U

K

Q

S

O

Tube length

- Without tube
- 50 mm • (1.97 inch)
- 100 mm • (3.94 inch)
- 150 mm • (5.90 inch)
- 200 mm • (7.87 inch)

0

1

2

3

4

Other version:

Add Order code and plain text:

Wetted parts materials: ...,

Tube length: ...

Z

8

K 1 Y

Selection and Ordering data

Article No. Ord.code

Diaphragm seal

7MF4910-

Directly fitted to a pressure transmitter SITRANS P for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-...¹⁾; must be ordered separately

Filling liquid

- Silicone oil M5
- Silicone oil M50
- High-temperature oil
- Halocarbon oil (for measuring O₂)³⁾
- Food oil (FDA listed)

1

2

3

4

7

9

M 1 Y

Other version

Add Order code and plain text:

Filling liquid: ...

- 1) With 7MF802.-... and the measuring cells Q, S, T and U also order the vacuum-tight version.
- 2) For vacuum on request.
- 3) Oil- and grease- free cleaning to DIN 25410, level 2 and packaging included in the scope of delivery.

Diaphragm seals of flange design directly fitted on transmitter

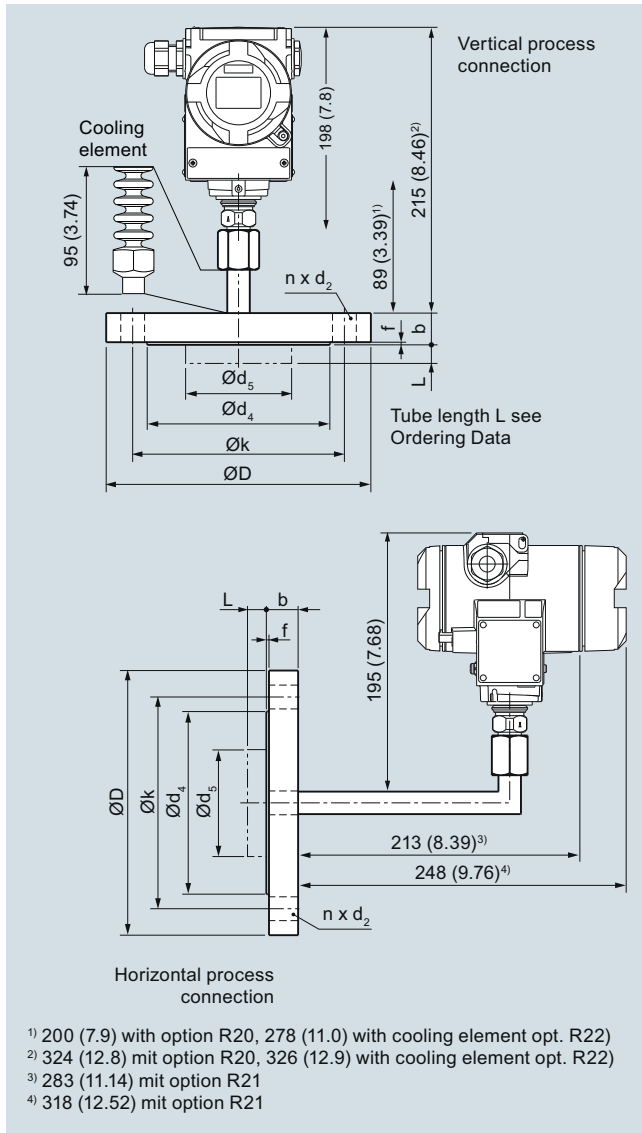
Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Further designs	
Please add "-Z" to Article No. and specify Order code.		Please add "-Z" to Article No. and specify Order code.	
Spark arrester	A01	Sealing surface B1 or ASME B16.5 RF 125 ... 250 AA	J12
With spark arrester for mounting on zone 0 (including documentation) for transmitters for gauge pressure and absolute pressure		Instead of sealing surface B2 and RFSF (Only for wetted parts in Hastelloy C276 (2.4819), Tantal and Duplex 2205 (1.4462) and for sizes 2", 3", DN 50 and DN 80)	
Remote seal nameplate	B20	Sealing surface groove, EN 1092-1, form D	J14
Attached out of stainless steel, contains MLFB and order number of the remote seal		instead of sealing surface B1 (only for wetted parts made of stainless steel 316L)	
Oil- and grease-free cleaned version	C10	Sealing surface RJF (groove) ASME B16.5	J24
Oil- and grease-free cleaned and packed version, not for oxygen application, only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2		instead of sealing surface ASME B16.5 RF 125 ... 250 AA (only for wetted parts made of stainless steel 316L)	
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	Elongated pipe	R20
Inspection certificate	C12	200 mm instead of 89 mm, max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.	
to EN 10204, section 3.1		Elongated pipe elbow	R21
2.2 Certificate of FDA approval of fill oil	C17	200 mm instead of 130 mm, max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.	
Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"		Cooling element	R22
Functional safety certificate ("SIL 2") to IEC 61508	C20	max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.	
(Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)		Vacuum-proof design	V01
Functional safety certificate ("SIL 2/3") to IEC 61508	C23	for use in low-pressure range for transmitters for gauge and absolute pressure from the pressure series	
(Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)			
Certification acc. to NACE MR-0175	D07		
Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)			
Certification acc. to NACE MR-0103	D08		
Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)			
Oil- and grease-free cleaned version	E10		
Oil- and grease-free cleaned and packed version, only for oxygen application, only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2			
Epoxy painting	E15		
Not possible with vacuum-proof design Color: transparent, coverage: front and rear of the remote seal, capillary(ies) or connecting tube, process connection of the transmitter. With transmitters 7MF40.. and 7MF42..., only possible with process connection G½B according to EN837-1.			

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design directly fitted on transmitter

Dimensional drawings



Diaphragm seals of flange design, direct connection to a SITRANS P pressure transmitter (process connection vertical (top) and horizontal (bottom)), dimensions in mm (inch)

Connection to EN 1092-1

Nom. diam.	Nom. press.	b	D	d ₂	d ₄	d ₅	d _M	f	k	n
		mm	mm	mm	mm	mm	mm	mm	mm	
DN 50	PN 10/16/25/40	20	165	18	102	48.3	45 ¹⁾	2	125	4
	PN 100	28	195	26	102	48.3	45 ¹⁾	2	145	4
DN 80	PN 10/16/25/40	24	200	18	138	76	72 ¹⁾	2	160	8
	PN 100	32	230	26	138	76	72 ¹⁾	2	180	8
DN 100	PN 10/16	20	220	18	158	94	89-2	2	180	8
	PN 25/40	24	235	22	162	94	89	2	190	8

Connection to ASME B16.5

Nom. diam.	Nom. press.	b	D	d ₂	d ₄	d ₅	d _M	f	k	n
lb/sq.in.	mm	mm	mm	mm	mm	mm	mm	mm	mm	
	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	
2 inch	150	19.5	150	20	92	48.3	45 ¹⁾	2	120.5	4
		(0.77)	(5.91)	(0.79)	(3.62)	(1.9)	(1.77) ¹⁾	(0.08)	(4.74)	
	300	22.7	165	20	92	48.3	45 ¹⁾	2	127	8
		(0.89)	(6.5)	(0.79)	(3.62)	(1.9)	(1.77) ¹⁾	(0.08)	(5)	
400/600	32.4	165	20	92	48.3	45 ¹⁾	7	127	8	
	(1.28)	(6.5)	(0.79)	(3.62)	(1.9)	(1.77) ¹⁾	(0.28)	(5)		
900/1500	45.1	215	26	92	48.3	45 ¹⁾	7	165	8	
	(1.78)	(8.46)	(1.02)	(3.62)	(1.9)	(1.77) ¹⁾	(0.28)	(6.5)		
3 inch	150	24.3	190	20	127	76	72 ²⁾	2	152.5	4
		(0.96)	(7.48)	(0.79)	(5)	(3)	(2.83) ²⁾	(0.08)	(6)	
	300	29	210	22	127	76	72 ²⁾	2	168.5	8
	(1.14)	(8.27)	(0.87)	(5)	(3)	(2.83) ²⁾	(0.08)	(6.63)		
600	38.8	210	22	127	76	72 ²⁾	7	168.5	8	
	(1.53)	(8.27)	(0.87)	(5)	(3)	(2.83) ²⁾	(0.28)	(6.63)		
4 inch	150	24.3	230	20	158	94	89	2	190.5	8
		(0.96)	(9.06)	(0.79)	(6.22)	(3.69)	(3.50)	(0.08)	(7.5)	
	300	32.2	255	22	158	94	89	2	200	8
	(1.27)	(10.04)	(0.79)	(6.22)	(3.69)	(3.50)	(0.08)	(7.87)		
400	42	255	26	158	94	89	7	200	8	
	(1.65)	(10.04)	(1.02)	(6.22)	(3.69)	(3.50)	(0.28)	(7.87)		

d: Inside diameter of gasket according to EN 1092-1/ASME B16.5

d_M: Effective diaphragm diameter

¹⁾ 59 mm = 2.32 inch with tube length L = 0

²⁾ 89 mm = 3½ inch with tube length L = 0

Overview



Diaphragm seals of screwed design for pressure transmitters for differential pressure, fixed connection and with flexible capillary

Technical specifications

Diaphragm seals of screwed design for pressure transmitters for differential pressure, fixed connection and with flexible capillary

Nominal diameter	Nominal pressure	Sealing material in the process flanges	
• DN 50	PN 10/16/25/40, PN 100	• For pressure transmitters, absolute pressure transmitters and low-pressure applications	Copper
• DN 80	PN 10/16/25/40	• For other applications	Viton
• DN 100	PN 10/16, PN 25/40	Maximum pressure	See above and the technical data of the pressure transmitter
• 2 inch	class 150, class 300, class 400/600, class 900/1500	Tube length	Without tube 50 mm (1.97 inch) 100 mm (3.94 inch) 150 mm (5.91 inch) 200 mm (7.87 inch)
• 3 inch	Class 150, class 300	Capillary	
• 4 inch	Class 150, class 300	• Length	Max. 10 m (32.8 ft), longer lengths on request
Sealing face	To EN 1092-1, form B1 or ASME B16.5 RF 125 ... 250 AA	• Internal diameter	2 mm (0.079 inch)
• For stainless steel, mat. No. 1.4404/316L	To EN 1092-1, form B2 or ASME B16.5 RFSF	• Minimum bending radius	150 mm (5.9 inch)
• For the other materials		Filling liquid	Silicone oil M5 Silicone oil M50 High-temperature oil Halocarbon oil (for measuring O ₂) Food oil (FDA listed) 170 °C (338 °F)
Materials		Max. recommended process temperature	
• Main body	Stainless steel mat. no. 1.4404/316L	Permissible ambient temperature	Dependent on the pressure transmitter and the filling liquid of the remote seal
• Wetted parts	Stainless steel mat. no. 1.4404/316L		More information can be found in the technical data of the pressure transmitters and in the section "Technical data of filling liquid" in the Technical description to the remote seals
	• Without coating	Weight	Approx. 4 kg (8.82 lb)
	• PTFE coating (for vacuum on request)	Certificate and approvals	
	• ECTFE coating (for vacuum on request)	Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
	• PFA coating (for vacuum on request)		
	Monel 400, mat. No. 2.4360		
	Hastelloy C276, mat. No. 2.4819		
	Hastelloy C4, mat. No. 2.4610		
	Tantalum		
	Duplex 2205, mat. no. 1.4462		
	Stainless steel 316L, gold plated, thickness approx. 25 µm		
• Capillary	Stainless steel, mat. No. 1.4571/316Ti		
• Sheath	Spiral hose made of stainless steel, mat. No. 1.4301/316		

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design fixed connection and with capillary

Selection and Ordering data	Article No.	Ord. code
Diaphragm seal	7MF4913-	
Mounting flange (with tube as option) for direct mounting to high-pressure side and flanged remote seal without tube , fitted by means of capillary to low-pressure side of SITRANS P for differential pressure, DS III series (7MF443...-...) and SITRANS P500 (7MF54...-...)	1 ■■■■ - ■ B ■■■■	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Flange, connection to EN 1092-1		
Nom. diam.	Nom. press.	
• DN 50	PN 10/16/25/40	A
	PN 100	B
• DN 80	PN 10/16/25/40	D
• DN 100	PN 10/16	G
	PN 25/40	H
Flange, connection to ASME B16.5		
Nom. diam.	Nom. press.	
• 2 inch	class 150	L
	class 300	M
	class 400/600	N
	class 900/1500	P
• 3 inch	Class 150	Q
	Class 300	R
• 4 inch	Class 150	T
	Class 300	U
Other version		Z
Add Order code and plain text: Flange: ..., Nominal diameter: ...; Nominal pressure: ...		J 1 Y
Wetted parts materials		
Smooth sealing face to EN 1092-1, form B1 or B2, or to ASME B16.5 RF 125 ... 250 AA or RFSF		
• Stainless steel 316L		A
- without coating		E 0
- with PTFE coating		F
- with ECTFE coating ¹⁾		D
- with PFA coating		G
• Monel 400, mat. No. 2.4360		J
• Hastelloy C276, mat. No. 2.4819		U
• Hastelloy C4, mat. No. 2.4610		K
• Tantalum		Q
• Duplex, mat. no. 1.4462		R
• Duplex, mat. no. 1.4462, incl. main body		S 0
• Stainless steel 316L, gold plated, thickness approx. 25 µm		
Tube length		
(for mounting flange on high-pressure side)		
• Without tube		0
• 50 mm (1.97 inch)		1
• 100 mm (3.94 inch)		2
• 150 mm (5.90 inch)		3
• 200 mm (7.87 inch)		4
Other version:		Z 8
Add Order code and plain text: Wetted parts materials:, Tube length: ...		K 1 Y
Filling liquid		
• Silicone oil M5		1
• Silicone oil M50		2
• High-temperature oil		3
• Halocarbon oil (for measuring O ₂) ²⁾		4
• Food oil (FDA listed)		7
Other version		9
Add Order code and plain text: Filling liquid: ...		M 1 Y

Selection and Ordering data	Article No.	Ord. code
Diaphragm seal	7MF4913-	
Mounting flange (with tube as option) for direct mounting to high-pressure side and flanged remote seal without tube , fitted by means of capillary to low-pressure side of SITRANS P for differential pressure, DS III series (7MF443...-...) and SITRANS P500 (7MF54...-...)	1 ■■■■ - ■ B ■■■■	
Length of capillary³⁾		
• 1.0 m (3.28 ft)		2
• 1.6 m (5.25 ft)		3
• 2.5 m (8.20 ft)		4
• 4.0 m (13.1 ft)		5
• 6.0 m (19.7 ft)		6
• 8.0 m (26.25 ft)		7
• 10.0 m (32.8 ft)		8
Special lengths for capillaries		
• 2.0 m	9	N 1 C
• 3.0 m	9	N 1 E
• 5.0 m	9	N 1 G
• 7.0 m	9	N 1 J
• 9.0 m	9	N 1 L

1) For vacuum on request.

2) Oil- and grease- free cleaning to DIN 25410, level 2 and packaging included in the scope of delivery.

3) Max. capillary length, see section "Technical description".

Diaphragm seals of flange design fixed connection and with capillary

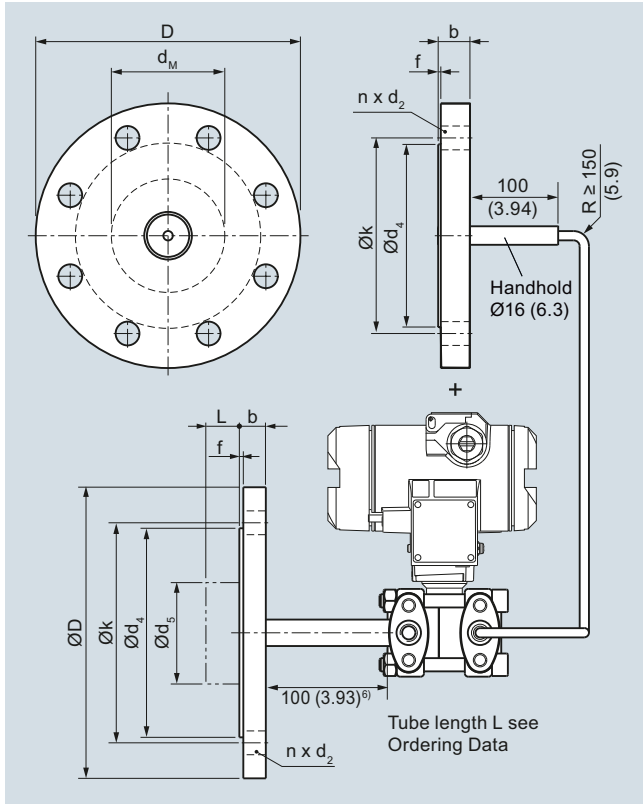
Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Further designs	
Please add "-Z" to Article No. and specify Order code.		Please add "-Z" to Article No. and specify Order code.	
Spark arrester With spark arrester for mounting on zone 0 (including documentation)	A02	PE protective tube over the spiral protective tube (color: white) of the capillaries	
Remote seal nameplate Attached out of stainless steel, contains MLFB and order number of the remote seal	B20	1.0 m	N20
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, not for oxygen application, only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2	C10	1.6 m	N21
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	2.0 m	N22
Inspection certificate to EN 10204, section 3.1	C12	2.5 m	N23
2.2 Certificate of FDA approval of fill oil Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"	C17	3.0 m	N24
Functional safety certificate ("SIL 2") to IEC 61508 (Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)	C20	4.0 m	N25
Functional safety certificate ("SIL 2/3") to IEC 61508 (Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)	C23	5.0 m	N26
Certification acc. to NACE MR-0175 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D07	6.0 m	N27
Certification acc. to NACE MR-0103 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D08	7.0 m	N28
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, only for oxygen application, only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2	E10	8.0 m	N29
Epoxy painting Not possible with vacuum-proof design. Color: transparent, coverage: front and rear of the remote seal, capillary(ies) or connecting tube, process connection of the transmitter. With transmitters 7MF40.. and 7MF42..., only possible with process connection G½B according to EN837-1.	E15	9.0 m	N30
Sealing surface B1 or ASME B16.5 RF 125 ... 250 AA Instead of sealing surface B2 and RFSF (Only for wetted parts in Hastelloy C276 (2.4819), Tantal and Duplex 2205 (1.4462) and for sizes 2", 3", DN 50 and DN 80)	J12	10.0 m	N31
Sealing surface groove, EN 1092-1, form D instead of sealing surface B1 (only for wetted parts made of stainless steel 316L)	J14		
Sealing surface RJF (groove) ASME B16.5 instead of sealing surface ASME B16.5 RF 125 ... 250 AA (only for wetted parts made of stainless steel 316L)	J24		
		Elongated pipe, distance from transmitter process flange to flange is 150 mm instead of 100 mm, max. medium temperature 250 °C, observe the maximum permissible media temperature of the filling liquid.	R15
		Elongated pipe, distance from transmitter process flange to flange is 100 mm instead of 100 mm, max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.	R20
		Vacuum-proof design for use in low-pressure range	V03

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seals of flange design fixed connection and with capillary

Dimensional drawings



Diaphragm seals of screwed design with flexible capillary, fixed connection, for connection to a SITRANS P pressure transmitter for differential pressure, dimensions in mm (inch)

Connection to EN 1092-1

Nom. diam.	Nom. press.	b	D	d ₂	d ₄	d ₅	d _M	f	k	n
		mm	mm	mm	mm	mm	mm	mm	mm	mm
DN 50	PN 10/16/25/40	20	165	18	102	48.3	45 ¹⁾	2	125	4
	PN 100	28	195	26	102	48.3	45 ¹⁾	2	145	4
DN 80	PN 10/16/25/40	24	200	18	138	76	72 ²⁾	2	160	8
	PN 100	32	230	26	138	76	72 ²⁾	2	180	8
DN 100	PN 10/16	20	220	18	158	94	89	2	180	8
	PN 25/40	24	235	22	162	94	89	2	190	8

Connection to ASME B16.5

Nom. diam.	Nom. press.	b	D	d ₂	d ₄	d ₅	d _M	f	k	n
		mm	mm	mm	mm	mm	mm	mm	mm	mm
	lb/sq.in.	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)	(inch)
2 inch	150	19.5	150	20	92	48.3	45 ¹⁾	2	120.5	4
		(0.77)	(5.91)	(0.79)	(3.62)	(1.9)	(1.77) ¹⁾	(0.08)	(4.74)	
	300	22.7	165	20	92	48.3	45 ¹⁾	2	127	8
		(0.89)	(6.5)	(0.79)	(3.62)	(1.9)	(1.77) ¹⁾	(0.08)	(5)	
400/600		32.4	165	20	92	48.3	45 ¹⁾	7	127	8
		(1.28)	(6.5)	(0.79)	(3.62)	(1.9)	(1.77) ¹⁾	(0.28)	(5)	
900/1500		45.1	215	26	92	48.3	45 ¹⁾	7	165	8
		(1.78)	(8.46)	(1.02)	(3.62)	(1.9)	(1.77) ¹⁾	(0.28)	(6.5)	
3 inch	150	24.3	190	20	127	76	72 ²⁾	2	152.5	4
		(0.96)	(7.48)	(0.79)	(5)	(3)	(2.83) ²⁾	(0.08)	(6)	
300		29	210	22	127	76	72 ²⁾	2	168.5	8
		(1.14)	(8.27)	(0.87)	(5)	(3)	(2.83) ²⁾	(0.08)	(6.63)	
4 inch	150	24.3	230	20	158	94	89	2	190.5	8
		(0.96)	(9.06)	(0.79)	(6.22)	(3.69)	(3.50)	(0.08)	(7.5)	
300		32.2	255	22	158	94	89	2	200	8
		(1.27)	(10.04)	(0.79)	(6.22)	(3.69)	(3.50)	(0.08)	(7.87)	

d: Inside diameter of gasket according to EN 1092-1 / ASME B16.5

d_M: Effective diaphragm diameter

¹⁾ 59 mm = 2.32 inch with tube length L = 0

²⁾ 89 mm = 3½ inch with tube length L = 0

Overview



Diaphragm seal, screwed gland design with inside diaphragm for gauge, absolute and differential pressure for direct mounting

Technical specifications

Diaphragm seal, screwed gland with inside diaphragm

Process connection	Nominal pressure
• Male thread G $\frac{1}{2}$ B to EN 837-1	PN 100, PN 250
• External thread $\frac{1}{2}$ -14" NPT-M	PN 100, PN 250
• open measurement flange	
- DN 25	PN 10 ... PN 40
- 1 inch	class 150, class 300
Sealing face for open measurement flange	
• For stainless steel, mat. no. 1.4404/316L	To EN 1092-1, form B1 or ASME B16.5 RF 125 ... 250 AA
Materials	
• Lower section (in the case of process connection thread)	Stainless steel, Mat. no. 1.4404/316L
• Diaphragm	Stainless steel, Mat. no. 1.4404/316L
	• No coating
	• With PTFE coating
	Monel 400, mat. no. 2.4360
	Hastelloy C276, mat. no. 2.4819
	Hastelloy C4, mat. no. 2.4610
	Tantal
	Stainless steel 316L, gold plated, thickness approx. 25 μ m
• Top section (process connection in the case of an open measurement flange)	Stainless steel, mat. no. 1.4404/316L
• Capillary	Stainless steel 1.4571/316Ti
• Sealing material on the process connection	Viton or copper (in the case of vacuum-free version)
• Sealing material between top and bottom section	Viton (FKM) (standard) Teflon (PTFE) metal spring ring (silver-coated)

Capillary	
• Length	Max. 10 m (32.8 ft)
• Internal diameter	2 mm (0.079 inch)
• Minimum bending radius	150 mm (5.9 inch)
Filling liquid	<ul style="list-style-type: none"> • Silicone oil M5 • Silicone oil M50 • High-temperature oil • Halocarbon oil (for measuring O₂) • Food oil (FDA listed)
Max. recommended process temperature	170 °C (338 °F)
Permissible ambient temperature	Dependent on the pressure transmitter and the filling liquid of the remote seal
	More information can be found in the technical specifications of the pressure transmitters and in the section "Technical data of filling liquid" in the introduction to the remote seals
Weight	Approx. 1.5 kg (3.3 lb)
Certificates and approvals	
Classification according to pressure equipment directive (PED 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)

Pressure Measurement

Remote seals for transmitters and pressure gauges

Diaphragm seal, screwed design directly mounted or/and with capillary

1

Selection and Ordering data			Article No. Ord. Code		Selection and Ordering data			Article No. Ord. Code	
Remote seal, screwed gland with inside diaphragm					Remote seal, screwed gland with inside diaphragm				
Mounted on SITRANS P pressure transmitter for			7MF4930-		Mounted on SITRANS P pressure transmitter for			7MF4930-	
<ul style="list-style-type: none"> • gauge pressure 7MF403.-... and SITRANS P300, 7MF802.-... • absolute pressure 7MF423.-... and SITRANS P300, 7MF802.-... In conjunction with Order code "V01" (vacuum-proof design) 					<ul style="list-style-type: none"> • gauge pressure 7MF403.-... and SITRANS P300, 7MF802.-... • absolute pressure 7MF423.-... and SITRANS P300, 7MF802.-... In conjunction with Order code "V01" (vacuum-proof design) 				
Mounted on either side of SITRANS P pressure transmitter for			7MF4933-		Mounted on either side of SITRANS P pressure transmitter for			7MF4933-	
<ul style="list-style-type: none"> • differential pressure 7MF443.-... and 7MF54.-... 					<ul style="list-style-type: none"> • differential pressure 7MF443.-... and 7MF54.-... 				
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			- B		Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			- B	
Type					Sealing material between top and bottom section				
<ul style="list-style-type: none"> • no flushing hole • with flushing hole 1x 1/8 NPT unsealed (only with process connection 316L) 			1 2		FKM (standard with diaphragm and 316L process connection)			1	
Other version, add Order code and plain text: Version: ...			9		PTFE (standard with custom material with max. 260 °C)			2	
			H 1 Y		Metal C- circlip, silver coated for >260 °C incl. high temperature-resistant screwed gland			3	
Process connection version					Filling liquid				
Lower flange material	Process connection	Nominal diameter and pressure level			<ul style="list-style-type: none"> • Silicone oil M5 • Silicone oil M50 • High-temperature oil • Halocarbon oil (for measuring O₂)¹⁾ • Food oil (FDA-listed) 			1 2 3 4 7	
316L/1.4404	Thread	G½B/PN100	B		Other version, add Order code and plain text: filling liquid: ...			9	
316L/1.4404	Thread	G½B/PN250	C					M 1 Y	
316L/1.4404	Thread	½NPT-M/PN100	E						
316L/1.4404	Thread	½NPT-M/PN250	F						
316L/1.4404	Thread	½NPT-F/PN100	H						
316L/1.4404	Thread	½NPT-F/PN250	J						
316L/1.4404	open measurement flange	DN 25/ PN 10 ... 40	N						
316L/1.4404	open measurement flange	1"/Class 150	P						
316L/1.4404	open measurement flange	1"/Class 300	Q						
PTFE	Thread	G½B/PN100	T						
PTFE	open measurement flange	DN 25/ PN 10 ... 40	U						
PTFE	open measurement flange	1"/Class 150	V						
PTFE	open measurement flange	1"/Class 300	W						
Other version, add Order code and plain text: Lower flange material: ...; Process connection: ...; Nominal diameter/pressure level: ...			Z					J 1 Y	
Diaphragm material					Capillary length²⁾				
Stainless steel 316L			A		<ul style="list-style-type: none"> • none, direct mounting • none, direct mounting with cooling element (not in conjunction with transmitter for differential pressure) 			0 1	
316L stainless steel with PTFE film			E		<ul style="list-style-type: none"> • 1 m • 1.6 m • 2.5 m • 4 m • 6 m • 8 m • 10 m 			2 3 4 5 6 7 8	
Hastelloy C276			J		Special lengths for capillaries				
Hastelloy C4			U		<ul style="list-style-type: none"> • 2.0 m • 3.0 m • 5.0 m • 7.0 m • 9.0 m 			9 9 9 9 9	
Tantalum			K					N 1 C N 1 E N 1 G N 1 J N 1 L	
Stainless steel 316L, gold plated, thickness approx. 25 µm			S						
Other version, add Order code and plain text: Diaphragm material: ...			Z					K 1 Y	

¹⁾ Oil- and grease- free cleaning to DIN 25410, level 2 and packaging included in the scope of delivery.

²⁾ Max. capillary length, see section "Technical description".

Diaphragm seal, screwed design directly mounted or/and with capillary

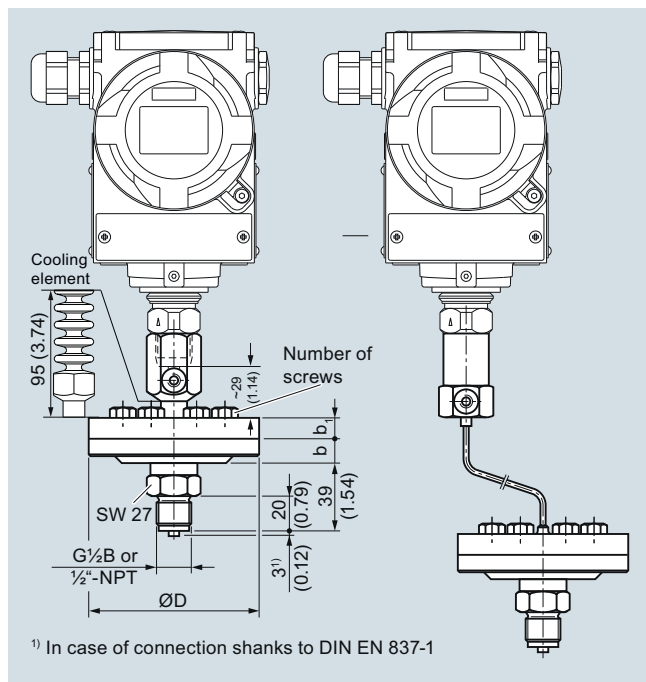
Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Further designs	
Add "-Z" to Article No. and specify Order code.		Add "-Z" to Article No. and specify Order code.	
Remote seal nameplate Attached out of stainless steel, contains MLFB and order number of the remote seal	B20	PE protective tube over the spiral protective tube (color: white) of the capillaries	
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, <u>not for oxygen application</u> , only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2	C10	1.0 m	N20
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11	1.6 m	N21
Inspection certificate to EN 10204, section 3.1	C12	2.0 m	N22
2.2 Certificate of FDA approval of fill oil Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"	C17	2.5 m	N23
Functional safety certificate ("SIL 2") to IEC 61508 (Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)	C20	3.0 m	N24
Functional safety certificate ("SIL 2/3") to IEC 61508 (Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)	C23	4.0 m	N25
Certification acc. to NACE MR-0175 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D07	5.0 m	N26
Certification acc. to NACE MR-0103 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D08	6.0 m	N27
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, <u>only for oxygen application</u> , only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2	E10	7.0 m	N28
Epoxy painting Not possible with vacuum-proof design. Color: transparent, coverage: front and rear of the remote seal, capillary(ies) or connecting tube, process connection of the transmitter. With transmitters 7MF40.. and 7MF42..., only possible with process connection G½B according to EN837-1.	E15	8.0 m	N29
Sealing surface groove, EN 1092-1, form D instead of sealing surface B1 (only for wetted parts made of stainless steel 316L)	J14	9.0 m	N30
Sealing surface RJF (groove) ASME B16.5 instead of sealing surface ASME B16.5 RF 125 ... 250 AA (only for wetted parts made of stainless steel 316L)	J24	10.0 m	N31
		Vacuum-proof design for use in low-pressure range for transmitters for	
		• Gauge and absolute pressure from the pressure series	V01
		• Differential pressure	V03

Pressure Measurement

Remote seals for transmitters and pressure gauges

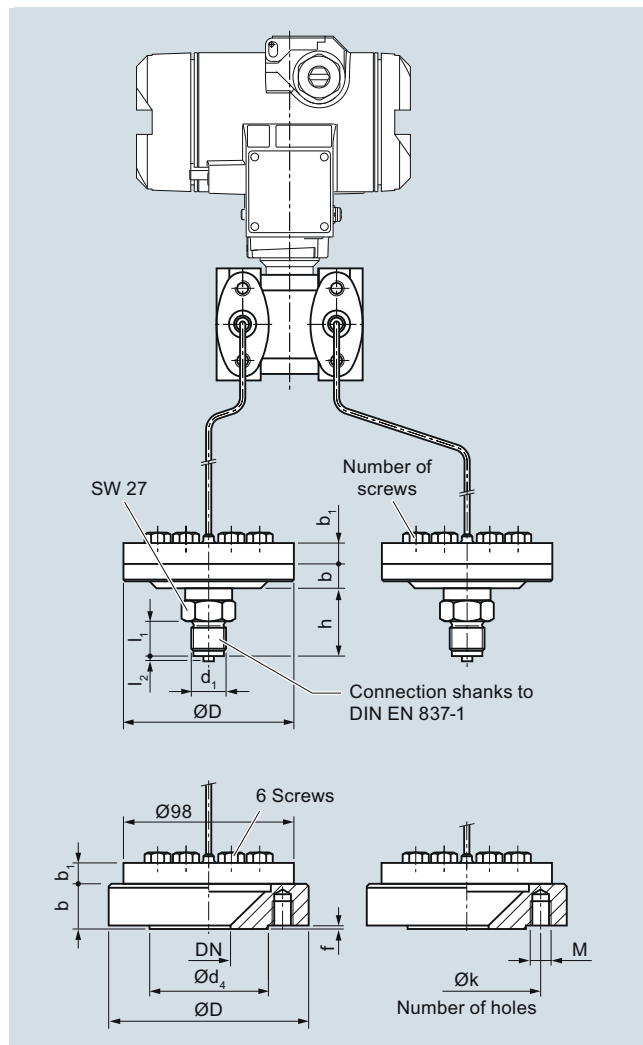
Diaphragm seal, screwed design directly mounted or/and with capillary

Dimensional drawings



Diaphragm seal, screwed gland with inside diaphragm, for gauge and absolute pressure, direct and attached directly to the transmitter with with capillaries, dimensions in mm (inch)

Range	D mm	b mm	b ₁ mm	Number of screws
bis 100 bar	98	14	16	6
bis 250 bar	98	14	20	12



Diaphragm seal, screwed gland with inside diaphragm, for differential pressure, direct and attached directly to the transmitter with with capillaries, dimensions in mm (inch)

Nominal diameter	Nominal pressure	D mm	d ₄ mm	k mm	M	Number of holes	b mm	b ₁ mm	f mm
DN 25	PN 10/16/25/40	115	68	85	M12	4	26	12	2
1 inch	150 lb/sq.in	108	50.8	79.2	M12	4	22	12	1.6
1 inch	300 lb/sq.in	124	50.8	88.9	M16	4	22	12	1.6

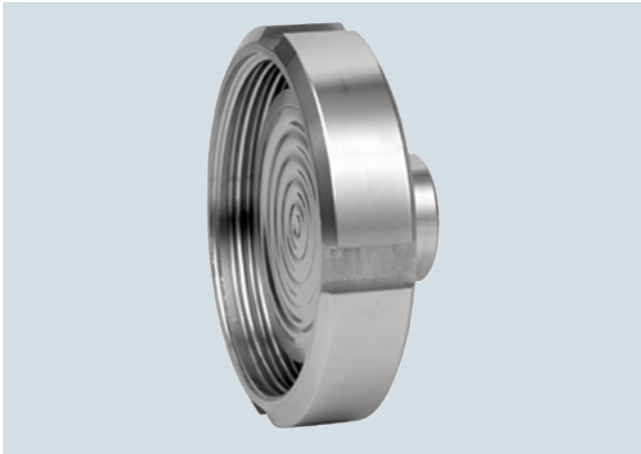
Pressure Measurement

Remote seals for transmitters and pressure gauges

Quick-release diaphragm seals

1

Overview



Quick-release diaphragm seals, to DIN 11851 with slotted union nut



Quick-release diaphragm seals, with clamp connection

Quick-release diaphragm seals are available for the following SITRANS P pressure transmitter series:

- For pressure: P300, DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus
- For differential pressure and flow: P500, DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus
- The quick-release remote seals are common designs in the food industry. Their design means that the measured medium cannot accumulate in dead volumes. The quick-release clamp present on the remote seal means that quick dismounting is possible for cleaning.

Technical specifications

Quick-release diaphragm seal

Connection, nominal diameter	Nominal pressure
<u>For pressure</u>	
• To DIN 11851 with slotted union nut	
- DN 25	PN 40
- DN 32	PN 40
- DN 40	PN 40
- DN 50	PN 25
- DN 65	PN 25
- DN 80	PN 25
• To DIN 11851 with threaded socket	
- DN 25	PN 40
- DN 32	PN 40
- DN 40	PN 40
- DN 50	PN 25
- DN 65	PN 25
- DN 80	PN 25

For pressure

• Clamp connection

- | | |
|-----------|-------|
| - 1½ inch | PN 16 |
| - 2 inch | PN 16 |
| - 2½ inch | PN 16 |
| - 3 inch | PN 10 |

For differential pressure and flow

• To DIN 11851 with slotted union nut

- | | |
|---------|-------|
| - DN 50 | PN 25 |
| - DN 65 | PN 25 |
| - DN 80 | PN 25 |

• To DIN 11851 with threaded socket

- | | |
|---------|-------|
| - DN 50 | PN 25 |
| - DN 65 | PN 25 |
| - DN 80 | PN 25 |

• Clamp connection

- | | |
|-----------|-------|
| - 2 inch | PN 16 |
| - 2½ inch | PN 16 |
| - 3 inch | PN 10 |

Sealing face

- | | |
|---|---|
| • For stainless steel, mat. No. 1.4404/316L | To EN 1092-1, form B1 or ASME B 16.5RF 125 ... 250 AA |
| • For the other materials | To EN 1092-1, form B2 or ASME B16.5 RFSF |

Materials

- | | |
|----------------|--|
| • Main body | Stainless steel 316L |
| • Wetted parts | Stainless steel 316L |
| • Capillary | Stainless steel, mat. No. 1.4571/316Ti |
| • Sheath | Spiral hose made of stainless steel, mat. No. 1.4301/316 |

Maximum pressure

See above and the technical data of the pressure transmitter

Tube length

Without tube

Capillary

• Length

Max. 10 m (32.8 ft), longer lengths on request

• Internal diameter

2 mm (0.079 inch)

• Minimum bending radius

150 mm (5.9 inch)

Filling liquid

Food oil (FDA listed)

Permissible ambient temperature

Dependent on the pressure transmitter and the filling liquid of the remote seal

More information can be found in the technical data of the pressure transmitters and in the section "Technical data of filling liquid" in the Technical description to the remote seals

Weight

Approx. 4 kg (8.82 lb)

Certificates and approvals

Classification according to pressure equipment directive (DRGL 97/23/EC)

For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)

EHEDG

Complies with EHEDG recommendations

Pressure Measurement

Remote seals for transmitters and pressure gauges

Quick-release diaphragm seals

1

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Ord. code
Quick-release diaphragm seal		7MF4940 -		Further designs		
for SITRANS P pressure transmitters for pressure 7MF403-... and 7MF423-... together with Order code "V01" (vacuum-proof design) and 7MF802-... ¹⁾ ; must be ordered separately Filling liquid: Food oil (FDA listed) Material: Stainless steel, mat. No. 1.4435				Please add "-Z" to Article No. and specify Order code.		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Remote seal nameplate		B20
				Attached out of stainless steel, contains MLFB and order number of the remote seal		
				Quality inspection certificate (Five-step factory calibration) to IEC 60770-2		C11
				Inspection certificate to EN 10204, section 3.1		C12
				2.2 Certificate of FDA approval of fill oil Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"		C17
				Functional safety certificate ("SIL 2") to IEC 61508 (Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)		C20
				Functional safety certificate ("SIL 2/3") to IEC 61508 (Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)		C23
				PE protective tube over the spiral protective tube (color: white) of the capillaries		
				1.0 m		N20
				1.6 m		N21
				2.0 m		N22
				2.5 m		N23
				3.0 m		N24
				4.0 m		N25
				5.0 m		N26
				6.0 m		N27
				7.0 m		N28
				8.0 m		N29
				9.0 m		N30
				10.0 m		N31
				Cooling element		R22
				max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.		
				Vacuum-proof design		V01
				for use in low-pressure range for gauge and absolute pressure from the pressure series		
Nom. diam.						
Nom. press.						
• Connection to DIN 11851 with slotted union nut						
- DN 25	PN 40	1 B				
- DN 32	PN 40	1 C				
- DN 40	PN 40	1 D				
- DN 50	PN 25	1 E				
- DN 65	PN 25	1 F				
- DN 80	PN 25	1 G				
• Connection to DIN 11851 with screw necks						
- DN 25	PN 40	2 B				
- DN 32	PN 40	2 C				
- DN 40	PN 40	2 D				
- DN 50	PN 25	2 E				
- DN 65	PN 25	2 F				
- DN 80	PN 25	2 G				
• Tri-Clamp connection to DIN 32676/ISO 2852						
- DN 40/1½ inch	PN 16	4 L				
- DN 50/2 inch	PN 16	4 M				
- DN 65/2½ inch	PN 16	4 N				
- DN 80/3 inch	PN 10	4 P				
Other version Add Order codes and plain text: Process connection: ..., Nominal diameter: ...; Nominal pressure: ...		9 A		H 1 Y		
Filling liquid						
• Food oil (FDA listed)		7				
Other version Add Order code and plain text: Filling liquid: ...		9		M 1 Y		
Connection to pressure transmitter						
• direct		0				
through capillary, length: ²⁾						
• 1.0 m	(3.28 ft)	2				
• 1.6 m	(5.25 ft)	3				
• 2.5 m	(8.20 ft)	4				
• 4.0 m	(13.1 ft)	5				
• 6.0 m	(19.7 ft)	6				
• 8.0 m	(26.25 ft)	7				
• 10.0 m	(32.8 ft)	8				
Special lengths for capillaries						
• 2.0 m		9	N 1 C			
• 3.0 m		9	N 1 E			
• 5.0 m		9	N 1 G			
• 7.0 m		9	N 1 J			
• 9.0 m		9	N 1 L			

¹⁾ With 7MF802-... and the measuring cells Q, S, T and U also order the vacuum-tight version.

²⁾ Max. capillary length, see section "Technical description"

Pressure Measurement

Remote seals for transmitters and pressure gauges

Quick-release diaphragm seals

1

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Order code
Quick-release diaphragm seal		7 MF 4 9 4 3 -		Further designs		
for SITRANS P pressure transmitters for pressure for differential pressure and flow, type 7MF443-... and 7MF54-...; order separately Filling liquid: Food oil (FDA listed) Material: Stainless steel, mat. No. 1.4435 Delivery unit: 2 off				Please add "-Z" to Article No. and specify Order code.		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Remote seal nameplate		B20
				Attached out of stainless steel, contains MLFB and order number of the remote seal		
				Quality inspection certificate (Five-step factory calibration) to IEC 60770-2		C11
				Inspection certificate		C12
				to EN 10204, section 3.1		
				2.2 Certificate of FDA approval of fill oil		C17
				Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"		
				Functional safety certificate ("SIL 2") to IEC 61508		C20
				(Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)		
				Functional safety certificate ("SIL 2/3") to IEC 61508		C23
				(Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)		
				PE protective tube		
				over the spiral protective tube (color: white) of the capillaries		
				1.0 m		N20
				1.6 m		N21
				2.0 m		N22
				2.5 m		N23
				3.0 m		N24
				4.0 m		N25
				5.0 m		N26
				6.0 m		N27
				7.0 m		N28
				8.0 m		N29
				9.0 m		N30
				10.0 m		N31
				Vacuum-proof design		V03
				for use in low-pressure range		
Nom. diam. Nom. press.						
• Connection to DIN 11851 with slotted union nut						
- DN 50	PN 25	1 E				
- DN 65	PN 25	1 F				
- DN 80	PN 25	1 G				
• Connection to DIN 11851 with threaded socket						
- DN 50	PN 25	2 E				
- DN 65	PN 25	2 F				
- DN 80	PN 25	2 G				
• Tri-Clamp connection to DIN 32676/ ISO 2852						
- DN 50/2 inch	PN 16	4 M				
- DN 65/2½ inch	PN 16	4 N				
- DN 80/3 inch	PN 10	4 P				
Other version						
Add Order codes and plain text:						
Process connection: ..., Nominal diameter: ...;		9 A		H 1 Y		
Nominal pressure: ...						
Filling liquid						
• Food oil (FDA listed)						
Other version						
Add Order code and plain text:						
Filling liquid: ...		7		M 1 Y		
		9				
Connection to transmitter						
through capillary, Length: ¹⁾						
• 1.0 m	(3.28 ft)	2				
• 1.6 m	(5.25 ft)	3				
• 2.5 m	(8.20 ft)	4				
• 4.0 m	(13.1 ft)	5				
• 6.0 m	(19.7 ft)	6				
• 8.0 m	(26.25 ft)	7				
• 10.0 m	(32.8 ft)	8				
Special lengths for capillaries						
• 2.0 m		9	N 1 C			
• 3.0 m		9	N 1 E			
• 5.0 m		9	N 1 G			
• 7.0 m		9	N 1 J			
• 9.0 m		9	N 1 L			

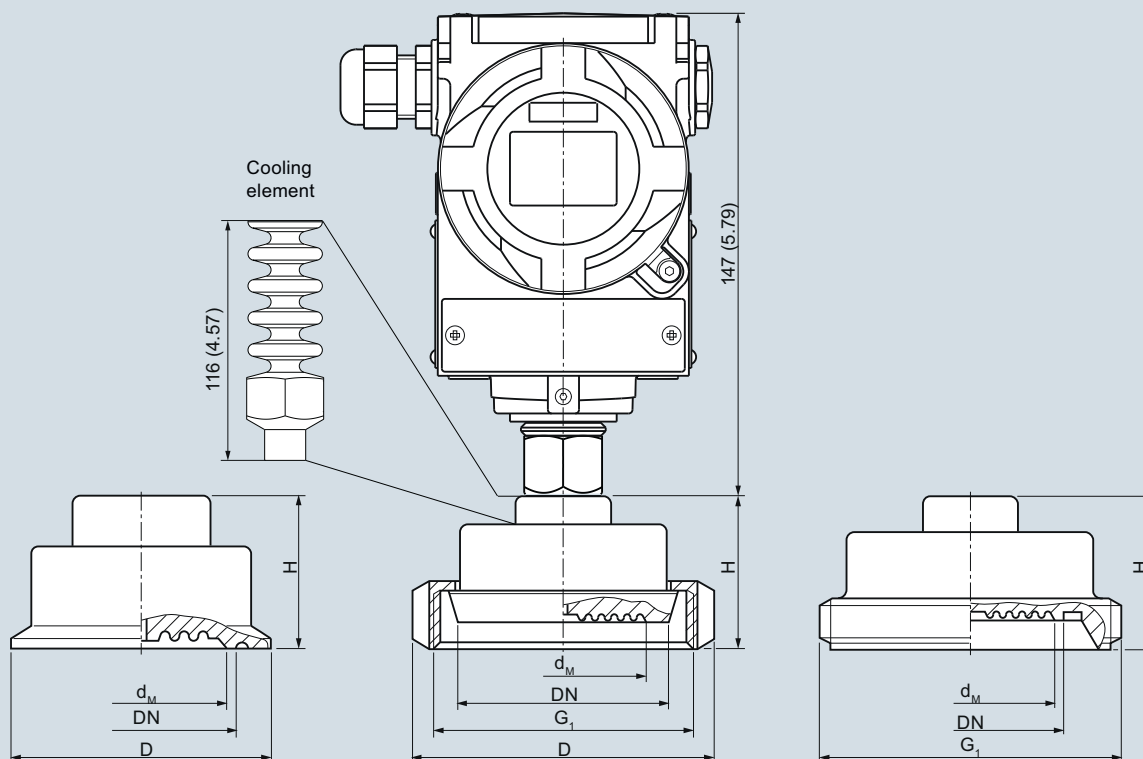
¹⁾ Max. capillary length, see section "Technical description"

Pressure Measurement

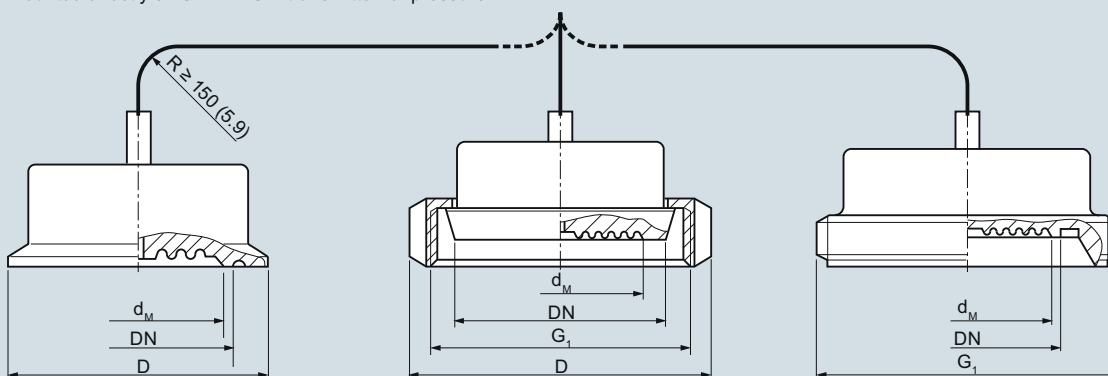
Remote seals for transmitters and pressure gauges

Quick-release diaphragm seals

Dimensional drawings



Mounted directly on SITRANS P transmitter for pressure



Mounted on SITRANS P transmitter for pressure or differential pressure and flow

Quick-release diaphragm seal, dimensions in mm (inch)

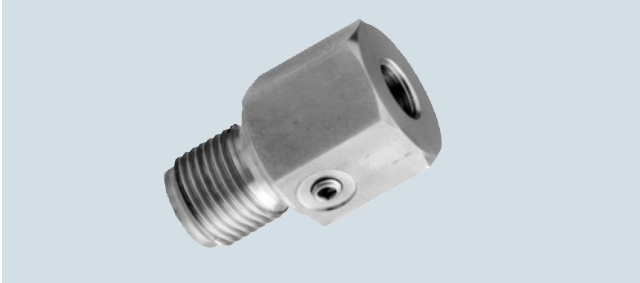
Clamp connection (left)					
DN	Ø d _M		Ø D	(2)	H
40 (1½ inch)	32 (1.26)	50.5	(2)	35	(1.38)
50 (2 inch)	40 (1.57)	64	(2.52)	35	(1.38)
65 (2½ inch)	52 (2.05)	77.5	(3.05)	35	(1.38)
80 (3 inch)	72 (2.83)	91	(3.58)	35	(1.38)

Connection to DIN 11851 with slotted union nut (center)					
DN	Ø d _M	Ø D	H	G ₁	
25	25	63	36	Rd 52x1/6	
32	32	70	36	Rd 52x1/6	
40	40	78	36	Rd 65x1/6	
50	52	112	36	Rd 78x1/6	
65	65	112	36	Rd 95x1/6	
80	72	127	36	Rd 110x1/6	
25	25	63	36	Rd 52x1/6	

Connection to DIN 11851 with threaded socket (right)				
DN	Ø d _M	H	G ₁	
25	25	36	Rd 52x1/6	
32	32	36	Rd 52x1/6	
40	40	36	Rd 65x1/6	
50	52	36	Rd 78x1/6	
65	65	36	Rd 95x1/6	
80	72	36	Rd 110x1/6	

d_M Effective diaphragm diameter

Overview



Miniature diaphragm seals

The miniature diaphragm seals are available for the following SITRANS P pressure transmitter series for pressure:

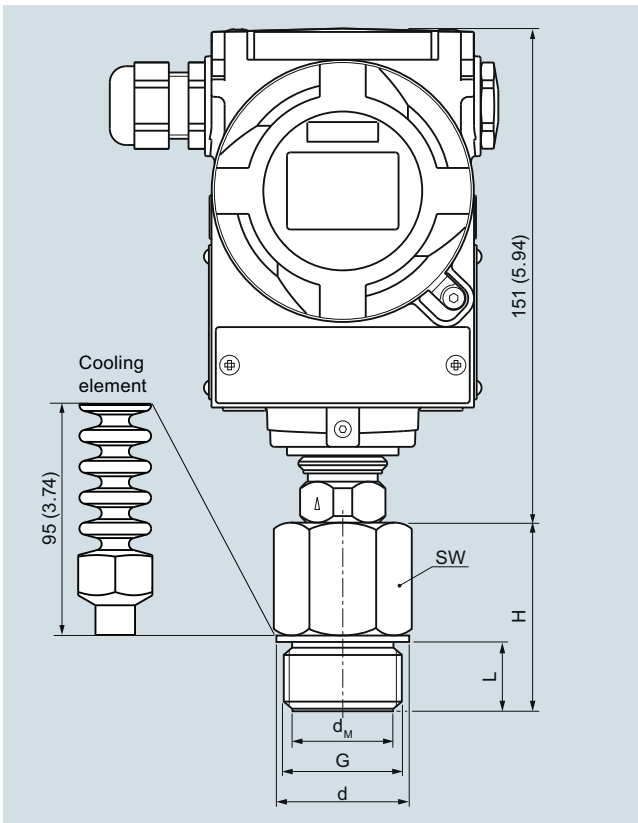
- P300, DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus

Suitable for high pressures, contaminated, fibrous and viscous media in the chemical, paper, food and drink industries.

Design

- Flush-mounted diaphragm
- No dead spaces
- Fixed threaded stems

Dimensional drawings



Miniature diaphragm seal, dimensions in mm (inch)

G	Ø d _M		SW		Ø d		L		H	
	mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)
G1B	25	(0.98)	41	(1.61)	39	(1.53)	28	(1.1)	56	(2.21)
G1½B	40	(1.57)	55	(2.17)	60	(2.36)	30	(1.18)	50	(1.97)
G2B	50	(1.97)	60	(2.36)	70	(2.76)	30	(1.18)	63	(2.48)

G	Ø d _M		SW		L		H	
	mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)
1"-NPT	27	(1.06)	41	(1.61)	25	(0.98)	40	(1.57)
1½"-NPT	34	(1.34)	55	(2.17)	26	(1.02)	45	(1.77)
2"-NPT	46	(1.81)	65	(2.56)	26	(1.02)	45	(1.77)

d_M: Effective diaphragm diameter

Technical specifications

Miniature diaphragm seals

Span with	<ul style="list-style-type: none"> • G1B and 1"-NPT • G1½B and 1½"-NPT • G2B and 2"-NPT 	<ul style="list-style-type: none"> > 6 bar (> 87 psi) > 2 bar (> 29 psi) > 600 mbar (> 8.7 psi)
Filling liquid		Silicone oil M5 or food oil (FDA listed)
Material	<ul style="list-style-type: none"> • Main body • Diaphragm 	Stainl. steel mat No. 1.4404 / 316L Stainl. steel mat No. 1.4404 / 316L
Maximum pressure		100% of nominal pressure of pressure transmitter, up to maximum of PN 400 (5802 psi) (depending on the seal used)
Temperature of use		Same as pressure transmitter
Temperature range of medium		Same as pressure transmitter
Max. recommended process temperature		150 °C (302 °F)
Weight	<ul style="list-style-type: none"> • G1B and 1"-NPT • G1½B and 1½"-NPT • G2B and 2"-NPT 	Approx. 0.3 kg (approx. 0.66 lb) Approx. 0.5 kg (approx. 1.10 lb) Approx. 0.8 kg (approx. 1.76 lb)
Certificate and approvals	Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)

Pressure Measurement

Remote seals for transmitters and pressure gauges

Miniature diaphragm seals

Selection and Ordering data

Miniature diaphragm seals

directly fitted to SITRANS P pressure transmitters for pressure; type, 7MF403-... and 7MF423-... together with Order code "V01" (vacuum-proof design) and 7MF802-...¹⁾; must be ordered separately

Material: Stainless steel, mat. No. 1.4404/316L
Nominal pressure, see "Pressure transmitters"

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process connection

- G1B
- G1½B
- G2B
- 1" - NPT
- 1½" - NPT
- 2" - NPT

Other version, add Order code and plain text:
Process connection: ...

Wetted parts materials

- Stainless steel 316L

Other version, add Order code and plain text:
Wetted parts materials: ...

Filling liquid

- Silicone oil M5
- Food oil (FDA listed)

Other version, add Order code and plain text:
Filling liquid: ...

¹⁾ With 7MF802-... and the measuring cells Q, S, T and U also order the vacuum-tight version.

Article No. Ord. code

7MF4960 -

1	0				
C				J	1 Y
D					
E					
K					
L					
M					
Z					
A				K	1 Y
Z					
			1		
			7		
			9	M	1 Y

Selection and Ordering data

Further designs

Please add "-Z" to Article No. and specify Order code.

Remote seal nameplate

Attached out of stainless steel, contains MLFB and order number of the remote seal

B20

Quality inspection certificate (Five-step factory calibration) to IEC 60770-2

C11

Inspection certificate

to EN 10204, section 3.1

C12

2.2 Certificate of FDA approval of fill oil

C17

Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"

Functional safety certificate ("SIL 2") to IEC 61508

C20

(Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)

Functional safety certificate ("SIL 2/3") to IEC 61508

C23

(Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)

Certification acc. to NACE MR-0175

D07

Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)

Certification acc. to NACE MR-0103

D08

Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)

Cooling element

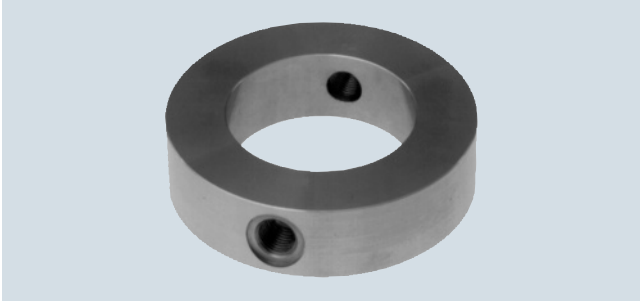
R22

max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.

Vacuum-proof design

V01

for use in low-pressure range for gauge and absolute pressure from the pressure series

Overview

Flushing ring

Flushing rings are required for flange-mounted and sandwich-type remote seals (Article No. 7MF4900 ... 7MF4923) if the danger exists that the process conditions and the geometry of the connection could cause the medium to form deposits or blockages.

The flushing ring is clamped between the process flange and the remote seal.

Deposits can be flushed away from the diaphragm through the holes in the side, or the pressure volume can be vented. Different nominal diameters and forms permit adaptation to the respective process flange.

Process connection

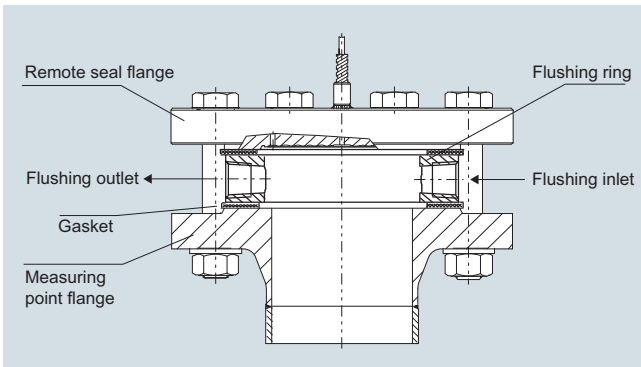
For flanges to EN and ASME:
DN 50, 80, 100, 125; PN 16 ... 100 or
DN 2 inch, 3 inch, 4 inch, 5 inch; Class 150 ... 600

Standard design

Material: CrNi-Stahl, mat. No. 1.4404/316L
Sealing faces and flushing holes: See Selection and Ordering data

Technical specifications**Flushing ring for remote seals of sandwich and flange design**

Nominal diameter	Nominal pressure
• DN 50	PN 16 ... PN 100
• DN 80	PN 16 ... PN 100
• DN 100	PN 16 ... PN 100
• DN 125	PN 16 ... PN 100
• 2 inch	Class 150 ... class 600
• 3 inch	Class 150 ... class 600
• 4 inch	Class 150 ... class 600
• 5 inch	Class 150 ... class 600
Sealing face	
• To EN 1092-1	Form B1
	Form B2
	Form D/Form D
	Form C/Form C
	Form C/Form C
	Form E
	Form F
• To ASME B16.5	RF 125 ... 250 AA
	RFSF
	RJF ring groove
Flushing holes (2 off), female thread	• G $\frac{1}{4}$
	• G $\frac{1}{2}$
	• $\frac{1}{4}$ -18 NPT
	• $\frac{1}{2}$ -14 NPT
Material	Stainless steel 1.4404/316L

Design

Installation example

Pressure Measurement

Remote seals for transmitters and pressure gauges

Flushing rings for diaphragm seals

1

Selection and Ordering data

Article No.Ord. code

Flushing ring

7MF4925 -

for remote seals 7MF4900 to 7MF4923

1

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Nom. diam.

- DN 50 PN 16 ... PN 100
- DN 80 PN 16 ... PN 100
- DN 100 PN 16 ... PN 100
- DN 125 PN 16 ... PN 100
- 2 inch Class 150 ... 600
- 3 inch Class 150 ... 600
- 4 inch Class 150 ... 600
- 5 inch Class 150 ... 600

A
B
C
D
G
H
J
K
Z

Other version

Add Order code and plain text:

Nominal diameter: ...; Nominal pressure: ...

J 1 Y

Sealing face

- EN 1092-1
 - Form B1
 - Form B2
 - Form C/Form C
 - Form D/Form C
 - Form D/Form D
 - Form E
 - Form F
- ASME B16.5
 - RF 125 ... 250 AA
 - RFSF
 - RJF ring groove

A
C
D
E
F
G
H
M
Q
R
Z

Other version

Add Order code and plain text:

Sealing face: ...

K 1 Y

Flushing holes (2 off)

- Female thread G $\frac{1}{4}$
- Female thread G $\frac{1}{2}$
- Female thread $\frac{1}{4}$ -18 NPT
- Female thread $\frac{1}{2}$ -14 NPT

1
2
3
4

Material

- Stainless steel 316L

Other version

Add Order code and plain text:

Material: ...

0

9 M 1 Y

Further designs

Please add "-Z" to Article No. and specify Order code.

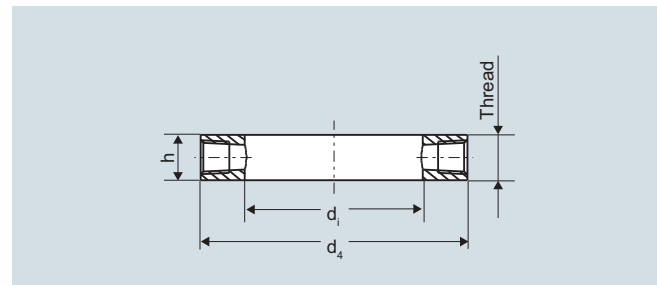
Order code

Inspection certificate

to EN 10204, section 3.1

C12

Dimensional drawings



Flushing ring, dimension drawing

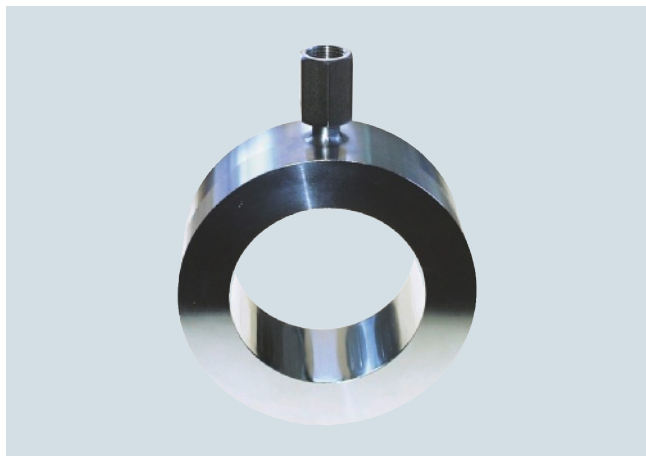
Connection to EN 1092-1

DN (mm)	PN (bar)	d ₄ (mm)	d _i (mm)	h (mm)	Weight (kg)
50	16 ... 100	102	62	30	1.10
80	16 ... 100	138	92	30	1.90
100	16 ... 100	162	92	30	3.15
125	16 ... 100	188	126	30	3.50

Connection to ASME B 16.5

DN inch	Class	d ₄ mm (in.)	d _i mm (in.)	h mm (in.)	Weight kg (lb)
2	150 ... 600	92 (3.62)	62 (2.44)	30 (1.18)	0.60 (1.32)
3	150 ... 600	127 (5)	92 (3.62)	30 (1.18)	1.05 (2.31)
4	150 ... 600	157 (6.18)	92 (3.62)	30 (1.18)	2.85 (6.28)
5	150 ... 600	185.5 (7.3)	126 (4.96)	30 (1.18)	3.30 (7.28)

Overview



Inline seals for flange-mounting

The inline seal is completely integrated in the process line. It is particularly suitable for flowing and highly viscous media.

The inline remote seal consists of a cylindrical jacket into which a thin-walled pipe is welded. It is clamped directly between two flanges in the pipeline.

Design

- Inline seals for flange-mounting (flange design) to EN/ASME for SITRANS P pressure transmitters
 - For pressure: P300, DS III with HART, DS III with PROFIBUS PA and DS III with FOUNDATION Fieldbus
 - For differential pressure and flow: DS III with HART, DS III with PROFIBUS PA, DS III with FOUNDATION Fieldbus and P500
- Sealing face to EN 1092-1 or ASME B16.5
- Connection to the transmitter directly or by means of a flexible capillary (max. 10 m long)
- See Technical data for details of materials used for the wetted parts
- Material used for the capillary, the guard sleeve, the seal's main body and the measuring cell: Stainless steel, mat.-No. 1.4571
- Filling liquid: Silicone oil, high-temperature oil, halocarbon oil, food oil (FDA listed) or glycerin/water (not suitable for uses in low-pressure range)

Function

The measured pressure is transferred from the diaphragm to the filling liquid and passes either directly or through the capillary to the measuring chamber of the pressure transmitter. The interior of the diaphragm seal and of the capillary, as well as the measuring chamber of the pressure transmitter, are filled gas-free by the filling liquid.

Note:

When operating in the low-pressure range, also during commissioning, it is recommended to use a vacuum-proof remote seal (see Selection and Ordering data).

Technical specifications

Inline seals for flange-mounting

Nominal diameter	Nominal pressure
• DN 25	PN 6 ... PN 100
• DN 40	PN 6 ... PN 100
• DN 50	PN 6 ... PN 100
• DN 80	PN 6 ... PN 100
• DN 100	PN 6 ... PN 100
• 1 inch	Class 150 ... class 2500
• 1½ inch	Class 150 ... class 2500
• 2 inch	Class 150 ... class 2500
• 3 inch	Class 150 ... class 2500
• 4 inch	Class 150 ... class 2500
Process connection	Flange to EN 1092-1 or ASME B 16.5
Sealing face	To EN 1092-1, form B1 or to ASME B16.5 RF 125 ... 250 A or RFSF
Materials	
• Main body	Stainless steel 1.4404/316L
• Diaphragm	Stainless steel 1.4404/316L
• Wetted parts	Stainless steel 1.4404/316L
	• Without coating
	• ECTFE coating
	• PFA coating (for vacuum on request)
	Monel 400, mat. No. 2.4360
	Hastelloy C276, mat. No. 2.4819
	Hastelloy C4, mat. No. 2.4610
	Tantalum
• Capillary	Stainless steel, mat. No. 1.4571/316Ti
• Sheath	Spiral hose made of stainless steel, mat. No. 1.4301/316
Capillary	
• Length	Max. 10 m (32.8 ft)
• Internal diameter	2 mm (0.079 inch)
• Minimum bending radius	150 mm (5.9 inch)
Filling liquid	Silicone oil M5
	Silicone oil M50
	High-temperature oil
	Halocarbon oil
	Food oil (FDA listed)
Permissible ambient temperature	See pressure transmitters, see filling liquid
Weight	Approx. 4 kg (8.82 lb)
Certificates and approvals	
Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with the requirements of article 3, paragraph 1 (appendix 1); assigned to category III, conformity evaluation module H by the TÜV Nord

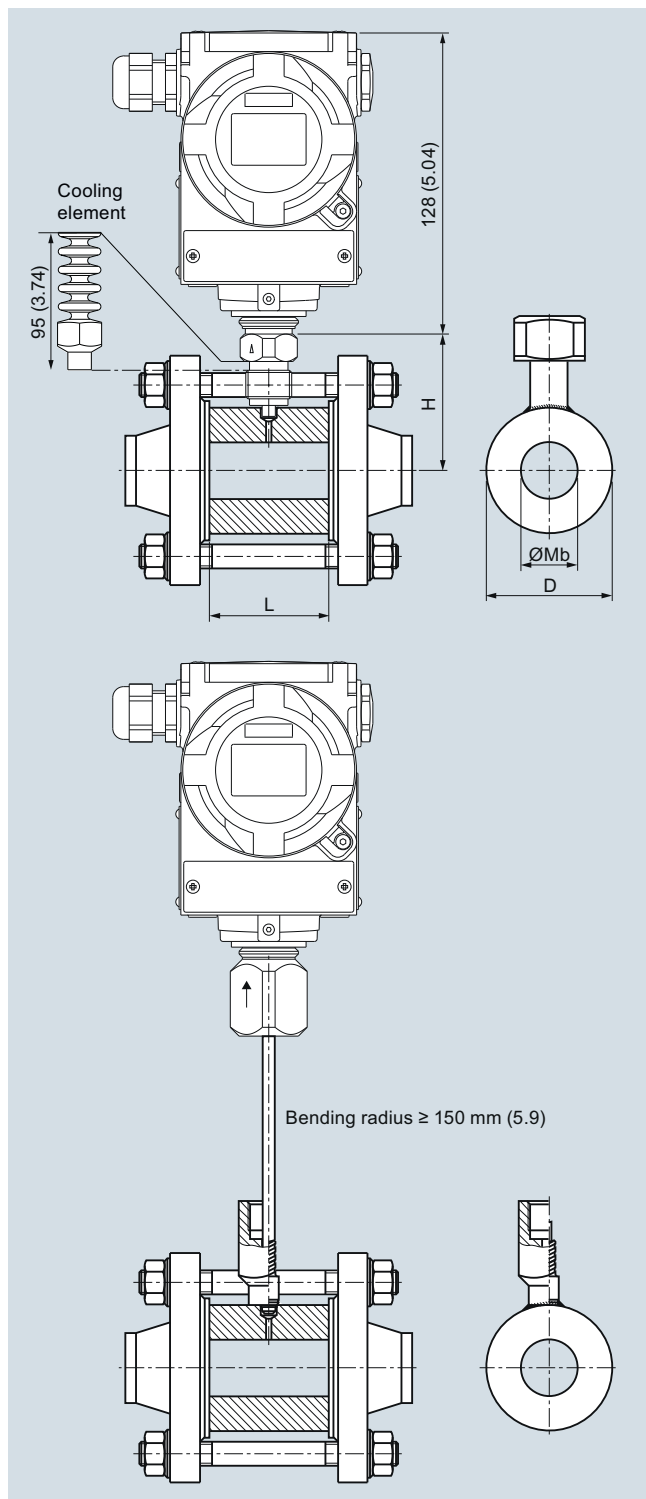
Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Further designs	
Please add "-Z" to Article No. and specify Order code.		Please add "-Z" to Article No. and specify Order code.	
Spark arrestor With spark arrestor for mounting on zone 0 (including documentation)		Cooling element max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.	R22
<ul style="list-style-type: none"> • Pressure and absolute pressure • for differential pressure transmitters 	A01 A02	Vacuum-proof design for use in low-pressure range	
Remote seal nameplate Attached out of stainless steel, contains MLFB and order number of the remote seal	B20	<ul style="list-style-type: none"> • for gauge and absolute pressure from the pressure series • for transmitters for differential pressure 	V01 V03
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, <u>not for oxygen application</u> , only in conjunction with halocarbon oil fill fluid, certified by certificate acc. to EN 10204-2.2	C10	Note: Suffix "Y01" required with pressure transmitter	
Quality inspection certificate (Five-step factory calibration) to IEC 60770-2	C11		
Inspection certificate to EN 10204, section 3.1	C12		
2.2 Certificate of FDA approval of fill oil Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"	C17		
Functional safety certificate ("SIL 2") to IEC 61508 (Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)	C20		
Functional safety certificate ("SIL 2/3") to IEC 61508	C23		
Certification acc. to NACE MR-0175 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D07		
Certification acc. to NACE MR-0103 Includes acceptance test certificate 3.1 according to EN 10204 (only for wetted parts made of stainless steel 1.4404/316L and Hastelloy C276)	D08		
Oil- and grease-free cleaned version Oil- and grease-free cleaned and packed version, <u>only for oxygen application</u> , only inert fill fluid may be used. Max. temperature: 60 °C (140 °F), max. pressure 50 bar (725 psi), only in connection with halocarbon oil, certified by certificate acc. to EN 10204-2.2	E10		
PE protective tube over the spiral protective tube (color: white) of the capillaries			
1.0 m	N20		
1.6 m	N21		
2.0 m	N22		
2.5 m	N23		
3.0 m	N24		
4.0 m	N25		
5.0 m	N26		
6.0 m	N27		
7.0 m	N28		
8.0 m	N29		
9.0 m	N30		
10.0 m	N31		
<u>only for 7MF4983-...</u>			
11.0 m	N32		
12.0 m	N33		
13.0 m	N34		
14.0 m	N35		
15.0 m	N36		

Pressure Measurement

Remote seals for transmitters and pressure gauges

Inline seals for flange-mounting

Dimensional drawings



Inline seal for flange-mounting, connected to SITRANS P pressure transmitter, dimensions in mm (inch)

Connection to EN 1092-1

DN mm	PN bar	D mm	Mb mm	L mm	H mm
25	6 ... 100	63	28.5	60	78.5
40	6 ... 100	85	43	60	89.5
50	6 ... 100	95	54.5	60	92.5
80	6 ... 100	130	82.5	60	112
100	6 ... 100	150	107	60	122

Connection to ASME B16.5

DN (inch)	Class	D mm (inch)	Mb mm (inch)	L mm (inch)	H mm (inch)
1	150 ... 2500	63 (2.48)	28.5 (1.12)	60 (2.36)	78.5 (3.1)
1½	150 ... 2500	85 (3.35)	43 (1.69)	60 (2.36)	86 (3.4)
2	150 ... 2500	95 (3.74)	54.5 (2.15)	60 (2.36)	94.5 (3.72)
3	150 ... 2500	130 (5.12)	82.5 (3.25)	60 (2.36)	112 (4.4)
4	150 ... 2500	150 (5.9)	107 (4.21)	60 (2.36)	122 (4.8)

Overview



Quick-release inline seals, to DIN 11851 with threaded socket



Quick-release inline seals, with clamp connection

Quick-release inline seals for pressure are available for the following SITRANS P pressure transmitter series:

- P300
- DS III with HART
- DS III with PROFIBUS PA
- DS III with FOUNDATION Fieldbus

Application

The quick-release inline seal is a special design for flowing media and high-viscosity media. Since it is completely integrated in the process pipe, no turbulences, dead volumes or other obstructions to the flow occur. The measured medium flows unhindered through the inline seal and results in self-cleaning of the measuring chamber. Furthermore, the inline seal can be cleaned by a pig.

Design

The quick-release clamp is available in two versions:

- DIN 11851 with threaded socket
- Clamp connection

The inline seal is connected to the pressure transmitter either directly or by way of a capillary.

Function

The measured pressure is transferred from the diaphragm, mounted on the inner circumference of the inline seal, to the filling liquid and then passes through the capillary to the measuring chamber of the pressure transmitter. The interior of the inline seal and of the capillary, as well as the measuring chamber of the pressure transmitter, are filled gas-free by the filling liquid.

Note:

When operating in the low-pressure range, also during commissioning, it is recommended to use a vacuum-proof pressure transmitter (see Selection and Ordering data).

Technical specifications

Inline seals of quick-release design for pressure

Connection	Nominal diameter	Nominal pressure
• To DIN 11851 with threaded socket	DN 25	PN 40
	DN 40	PN 40
	DN 50	PN 25
	DN 65	PN 25
	DN 80	PN 25
	DN 100	PN 25
• Clamp connection	1½ inch	PN 40
	2 inch	PN 40
	2½ inch	PN 40
	3 inch	PN 40
Material		
• Main body	Stainless steel 1.4404/316L	
• Diaphragm	Stainless steel 1.4404/316L	
Capillary		
• Length	Max. 10 m (32.8 ft)	
• Internal diameter	2 mm (0.079 inch)	
• Minimum bending radius	150 mm (5.9 inch)	
Filling liquid	• Food oil (FDA listed)	
Permissible ambient temperature	Dependent on the pressure transmitter and the filling liquid of the remote seal More information can be found in the technical data of the pressure transmitters and in the section "Technical data of filling liquid" in the Technical description to the remote seals	
Weight	Approx. 4 kg (approx. 8.82 lb)	
Certificate and approvals		
Classification according to pressure equipment directive (DRGL 97/23/EC)	For gases of fluid group 1 and liquids of fluid group 1; complies with the requirements of article 3, paragraph 1 (appendix 1); assigned to category III, conformity evaluation module H by the TÜV Nord	
EHEDG	Complies with EHEDG recommendations	

Pressure Measurement

Remote seals for transmitters and pressure gauges

Quick-release inline seals

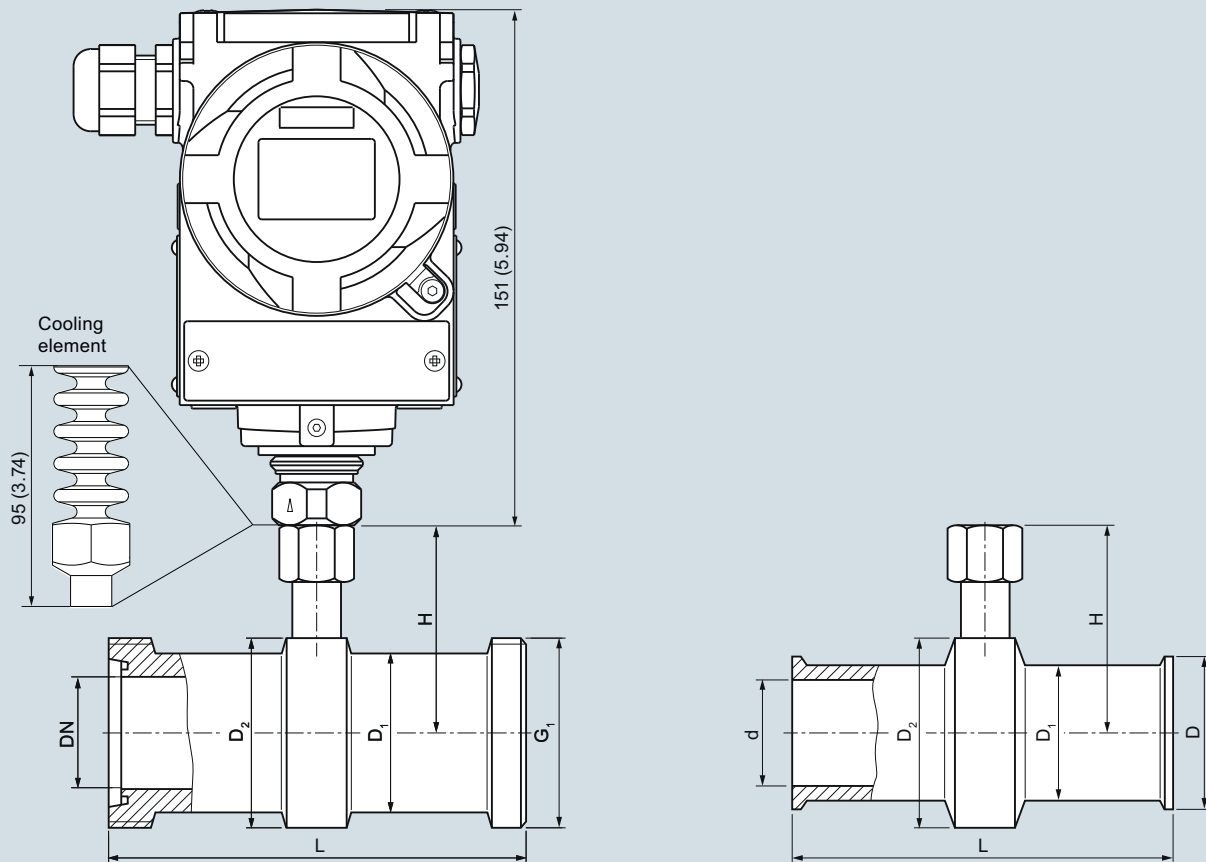
1

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Order code
Quick-release inline seal		7MF4950 -		Further designs		
for SITRANS P pressure transmitters for pressure 7MF403.-... and 7MF423.-... together with Order code "V01" (vacuum-proof design) and 7MF802.-... ¹⁾ ; must be ordered separately Filling liquid: Food oil (FDA listed) Material: Stainless steel 316L				Please add "-Z" to Article No. and specify Order code.		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Remote seal nameplate		B20
				Attached out of stainless steel, contains MLFB and order number of the remote seal		
				Quality inspection certificate (Five-step factory calibration) to IEC 60770-2		C11
				Inspection certificate to EN 10204, section 3.1		C12
				2.2 Certificate of FDA approval of fill oil Only in conjunction with "Food-grade oil" fill liquid (FDA listed)"		C17
				Functional safety certificate ("SIL 2") to IEC 61508 (Only in conjunction with the Order code "C20" in the case of SITRANS P DSIII transmitter)		C20
				Functional safety certificate ("SIL 2/3") to IEC 61508 (Only in conjunction with the Order code "C23" in the case of SITRANS P DSIII transmitter)		C23
				Special lengths for capillaries		
				2.0 m (select 2.5 m capillary pipe length for order and add N1C as identifier)		N1C
				3.0 m (select 4 m capillary pipe length for order and add N1E as identifier)		N1E
				5.0 m (select 6 m capillary pipe length for order and add N1G as identifier)		N1G
				7.0 m (select 8 m capillary pipe length for order and add N1J as identifier)		N1J
				9.0 m (select 10 m capillary pipe length for order and add N1L as identifier)		N1L
				PE protective tube over the spiral protective tube (color: white) of the capillaries		
				1.0 m		N20
				1.6 m		N21
				2.0 m		N22
				2.5 m		N23
				3.0 m		N24
				4.0 m		N25
				5.0 m		N26
				6.0 m		N27
				7.0 m		N28
				8.0 m		N29
				9.0 m		N30
				10.0 m		N31
				Cooling element max. medium temperature 300 °C, observe the maximum permissible media temperature of the filling liquid.		R22
				Vacuum-proof design for use in low-pressure range for gauge and absolute pressure from the pressure series		V01
Nom. diam.	Nom. press.					
• Connection to DIN 11851 with screw necks						
- DN 25	PN 40	2 B				
- DN 40	PN 40	2 D				
- DN 50	PN 25	2 E				
- DN 65	PN 25	2 F				
- DN 80	PN 25	2 G				
- DN 100	PN 25	2 H				
• Clamp connection						
- 1½ inch	PN 16	4 L				
- 2 inch	PN 16	4 M				
- 2½ inch	PN 16	4 N				
- 3 inch	PN 10	4 P				
Other version Add Order codes and plain text: Process connection: ..., Nominal diameter: ...; Nominal pressure: ...		9 A		H 1 Y		
Filling liquid						
• Food oil (FDA listed)		7				
Other version Add Order code and plain text: Filling liquid: ...		9		M 1 Y		
Connection to transmitter						
• Direct			0			
Through capillary, length: ²⁾						
• 1.0 m (3.28 ft)			2			
• 1.6 m (5.25 ft)			3			
• 2.5 m (8.20 ft)			4			
• 4.0 m (13.1 ft)			5			
• 6.0 m (19.7 ft)			6			
• 8.0 m (26.25 ft)			7			
• 10.0 m (32.8 ft)			8			
Special lengths for capillaries						
• 2.0 m			9	N 1 C		
• 3.0 m			9	N 1 E		
• 5.0 m			9	N 1 G		
• 7.0 m			9	N 1 J		
• 9.0 m			9	N 1 L		

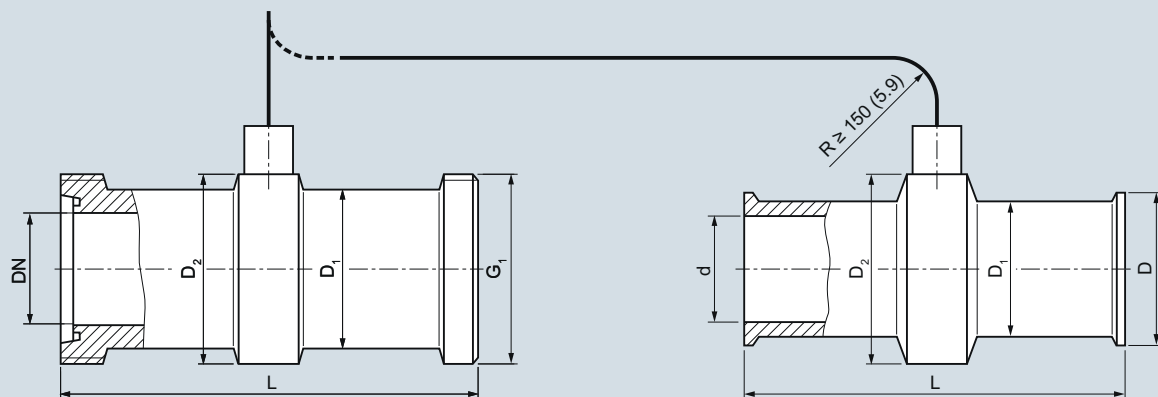
¹⁾ With 7MF802.-... and the measuring cells Q, S, T and U also order the vacuum-tight version.

²⁾ Max. capillary length, see section "Technical description"

Dimensional drawings



Mounted directly on SITRANS P transmitter for pressure



Mounted on SITRANS P transmitter for pressure or differential pressure and flow

Connection to DIN 11851 with screw necks

DN	Ø D ₁	Ø D ₂	H	L	G ₁
25	38	52	68	128	Rd 52x1/6
40	55	65	74.5	160	Rd 65x1/6
50	68	78	81	170	Rd 78x1/6
65	85	95	89.5	182	Rd 95x1/6
80	110	110	97	182	Rd 110x1/4
100	130	130	107	182	Rd 110x1/4

Clamp connection for pipes to BS 4825/3 and o.d. tubes

d	Ø D ₁	Ø D ₂	H	L	D
mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
22.2 (1)	38 (1.5)	50 (1.97)	67 (2.64)	114 (4.49)	50.5 (1.98)
34.9 (1½)	43 (1.69)	65 (2.56)	74.5 (2.93)	146 (5.75)	50.5 (1.98)
47.6 (2)	56 (2.2)	75 (2.95)	79.5 (3.13)	156 (6.14)	64 (2.52)
60.3 (2½)	68 (2.68)	77 (3.03)	80.5 (3.17)	156 (6.14)	77.5 (3.05)
73.0 (3)	82 (3.23)	91 (3.58)	87.5 (3.44)	156 (6.14)	91 (3.58)

Quick-release inline seal, dimensions in mm (inch)

Pressure Measurement

Remote seals for transmitters and pressure gauges

Measuring setups

Overview

This section shows examples of typical measuring setups for using SITRANS P pressure transmitters with and without remote seals.

Equations for calculating start of scale and full scale are provided for each example.

Questionnaires are included to help you select the right combination of remote seal and pressure transmitter.

Installation

Remote seals of sandwich design are fitted between the connection flange of the measuring point and a dummy flange. Remote seals of flange design are fitted directly on the connection flange of the measuring point. The respective pressure rating of the dummy flange or the flanged remote seal must be observed.

The pressure transmitter should be installed below the connection flange (and below the lower connection flange in the case of differential pressure transmitters). This arrangement must be used in the low-pressure range.

When measuring at pressures above atmospheric, the pressure transmitter can also be installed above the connection flange.

The capillaries between the remote seal and the pressure transmitter should be as short as possible to obtain a good transmission response.

Offset of measuring range

If there is a difference in height between the two connection flanges when measuring with two remote seals, an additional differential pressure will result from the oil filling of the remote seal capillaries. This results in a measuring range offset which has to be taken into account when you set the pressure transmitter.

An offset in the measuring range also occurs when combining a remote seal with a transmitter if the remote seal is not installed at the same height as the transmitter.

Pressure transmitter output

If the level, separation layer or density increase in closed vessels, the differential pressure and hence the output signal of the pressure transmitter also increase.

For an inverted relationship between the differential pressure and the output signal, the start-of-scale and full-scale values of the SITRANS P must be interchanged.

With open vessels, a rising pressure is usually assigned to an increasing level, separation layer or density.

Influence of ambient temperature

Temperature differences between the individual capillaries and between the individual remote seals should be avoided.

Temperature variations in the area of the measuring setup cause a change in volume of the filling liquid and hence measuring errors.

Notes

- For the separation layer measurement, the separation layer has to be positioned between the two spigots. Also you must make sure that the level in the container is always above the top spigot.
- When measuring density, make sure that the level of the medium remains constant. The level should be above the top spigot.

Possible combinations of pressure transmitters and remote seals

Type of installation	Pressure transmitters	Remote seals
A/B	7MF4033 7MF4034 7MF4035 7MF8023 7MF8024 7MF8025	7MF4900 7MF4910 7MF4920
C ₁ and C ₂	7MF4233 7MF4234 7MF4235 7MF4333 7MF4334 7MF4335	7MF4900 7MF4910 7MF4920 (vacuum-proof design in each case) 7MF4901 7MF4921
D	7MF4433 7MF4434 7MF4435 7MF5403 7MF5413	7MF4903 7MF4923
E	7MF4433 7MF4434 7MF4435 7MF5403 7MF5413	7MF4913
G, H and J	7MF4433 7MF4434 7MF4435 7MF5403 7MF5413	7MF4903 7MF4923

Dimensional drawings

Types of installation for pressure and level measurements (open vessels)

Installation type A

Pressure transmitter above the measuring point

Installation type B

Pressure transmitter below the measuring point

$H_1 \leq 7 \text{ m (23 ft)}$, with halocarbon oil as filling liquid only $H_1 \leq 4 \text{ m (13.1 ft)}$

Installation type A

Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U - \rho_{OIL} \cdot g \cdot H_1$

Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O - \rho_{OIL} \cdot g \cdot H_1$

Installation type B

Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U + \rho_{OIL} \cdot g \cdot H_1$

Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O + \rho_{OIL} \cdot g \cdot H_1$

Legend

p_{MA}	Start-of-scale value to be set
p_{ME}	Full-scale value to be set
ρ_{FL}	Density of medium in vessel
ρ_{OIL}	Density of filling oil in the capillary to the remote seal
g	Local acceleration due to gravity
H_U	Start-of-scale value
H_O	Full-scale value
H_1	Distance between vessel flange and pressure trans.

Types of installation for absolute level measurements (closed vessels)

Installation type C₁

Installation type C₂

Pressure transmitter for absolute pressure always below the measuring point: $H_1 \geq 200 \text{ mm (7.9 inch)}$

Installation type C₁ and C₂

Start-of-scale: $p_{MA} = p_{START} + \rho_{OIL} \cdot g \cdot H_1$

Full-scale: $p_{ME} = p_{END} + \rho_{OIL} \cdot g \cdot H_1$

Legend

p_{MA}	Start-of-scale value to be set
p_{ME}	Full-scale value to be set
p_{START}	Start-of-scale value
p_{END}	Full-scale value
ρ_{OIL}	Density of filling oil in the capillary to the remote seal
g	Local acceleration due to gravity
H_1	Distance between vessel flange and pressure trans.

Type of installation for differential pressure and flow measurements

Installation type D Filter monitoring

Installation type D

Start-of-scale: $p_{MA} = p_{START} - \rho_{OIL} \cdot g \cdot H_V$

Full-scale: $p_{ME} = p_{END} - \rho_{OIL} \cdot g \cdot H_V$

Legend

p_{MA}	Start-of-scale value to be set
p_{ME}	Full-scale value to be set
p_{START}	Start-of-scale value
p_{END}	Full-scale value
ρ_{OIL}	Density of filling oil in the capillary to the remote seal
g	Local acceleration due to gravity
H_V	Distance between the measuring points (spigots)

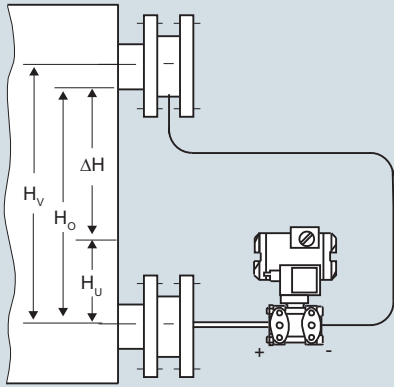
Pressure Measurement

Remote seals for transmitters and pressure gauges

Measuring setups with remote seals

Types of installation for level measurements (closed vessels)

Installation type E



Installation type E

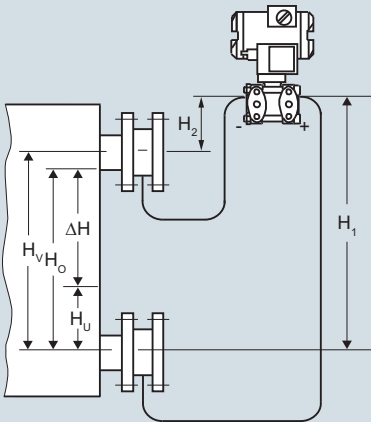
Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U - \rho_{OIL} \cdot g \cdot H_V$

Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O - \rho_{OIL} \cdot g \cdot H_V$

Legend

- p_{MA} Start-of-scale value to be set
- p_{ME} Full-scale value to be set
- ρ_{FL} Density of medium in vessel
- ρ_{OIL} Density of filling oil in the capillary to the remote seal
- g Local acceleration due to gravity
- H_U Start-of-scale value
- H_O Full-scale value
- H_V Distance between the measuring points (spigots)

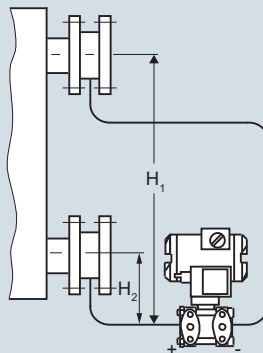
Installation type G



Pressure transmitter for differential pressure above the upper measuring point, no vacuum

$H_1 \leq 7 \text{ m (23 ft)}$, with halocarbon oil as filling liquid only $H_1 \leq 4 \text{ m (13.1 ft)}$

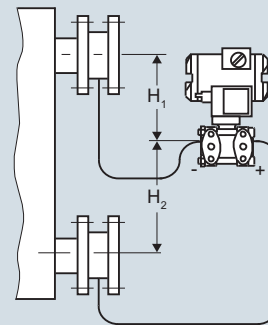
Installation type H



below the lower measuring point

Installation type for vacuum applications

Installation type J



between the measuring points, no vacuum

$H_2 \leq 7 \text{ m (23 ft)}$, with halocarbon oil as filling liquid only $H_2 \leq 4 \text{ m (13.1 ft)}$

Installation type G, H and J

Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U - \rho_{OIL} \cdot g \cdot H_V$

Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O - \rho_{OIL} \cdot g \cdot H_V$

Legend

- p_{MA} Start-of-scale value to be set
- p_{ME} Full-scale value to be set
- ρ_{FL} Density of medium in vessel
- ρ_{OIL} Density of filling oil in the capillary to the remote seal
- g Local acceleration due to gravity
- H_U Start-of-scale value
- H_O Full-scale value
- H_V Distance between the measuring points (spigots)

Overview

Notes

- For the separation layer measurement, the separation layer has to be positioned between the two spigots.

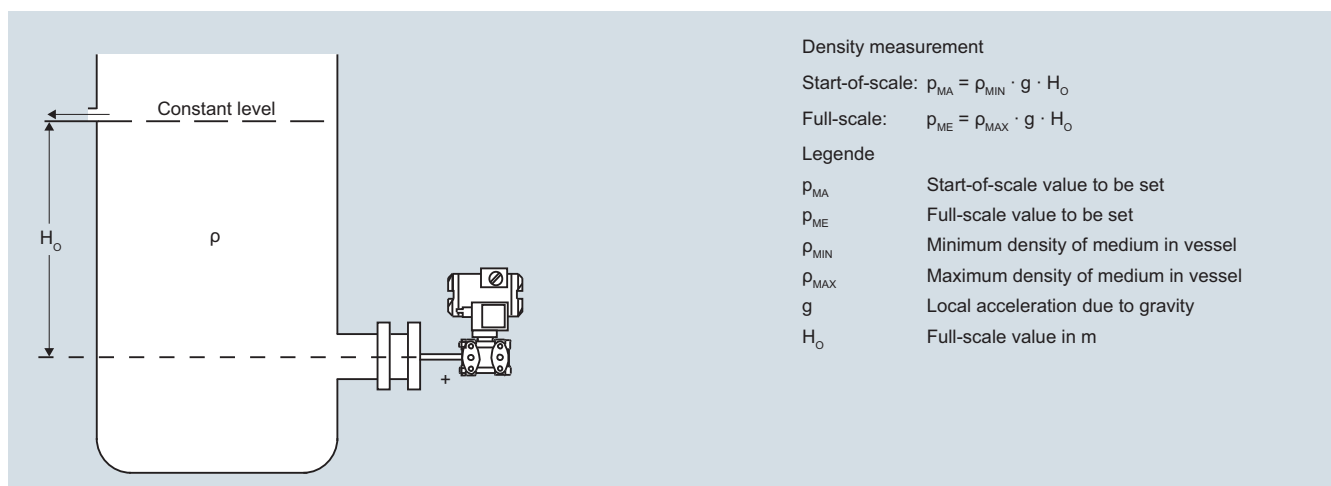
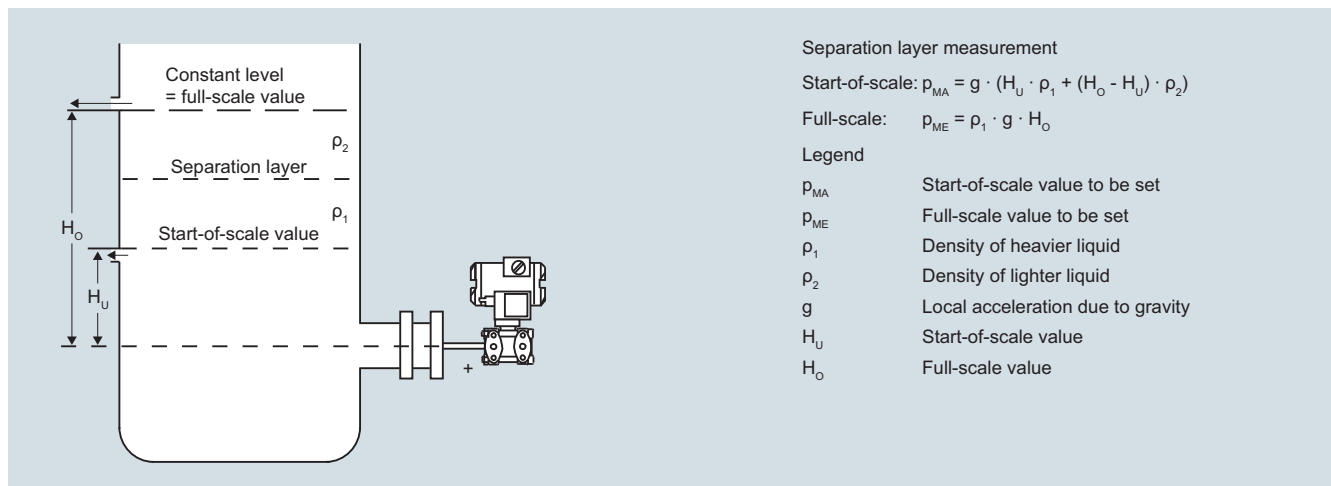
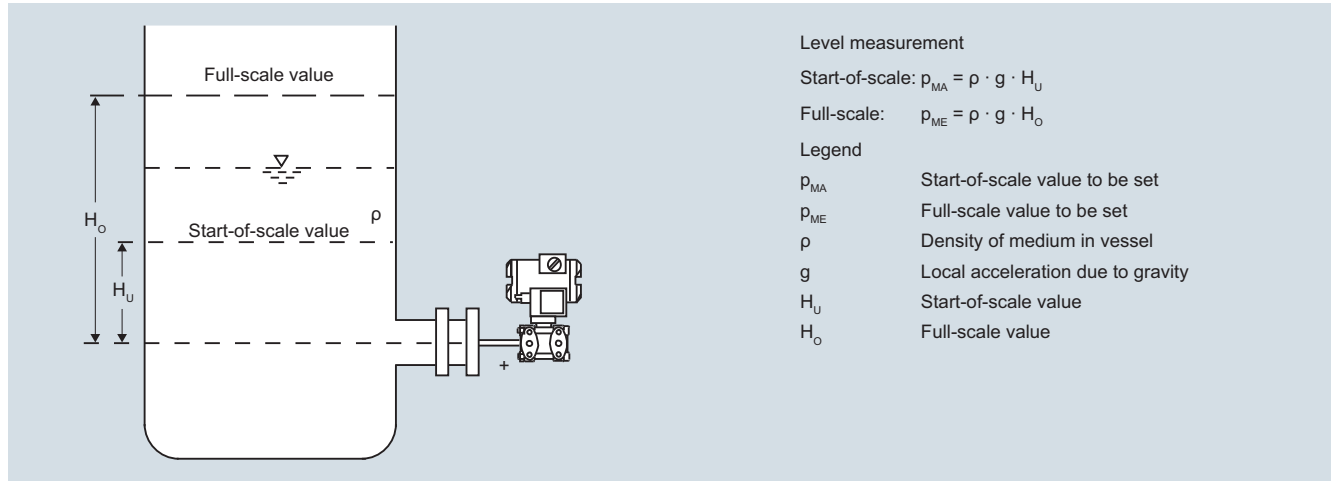
Also you must make sure that the level in the container is always above the top spigot.

- When measuring density, make sure that the level of the medium remains constant. The level should be above the top spigot

Dimensional drawings

Pressure transmitters for differential pressure, for flanging

Measuring setups for open containers

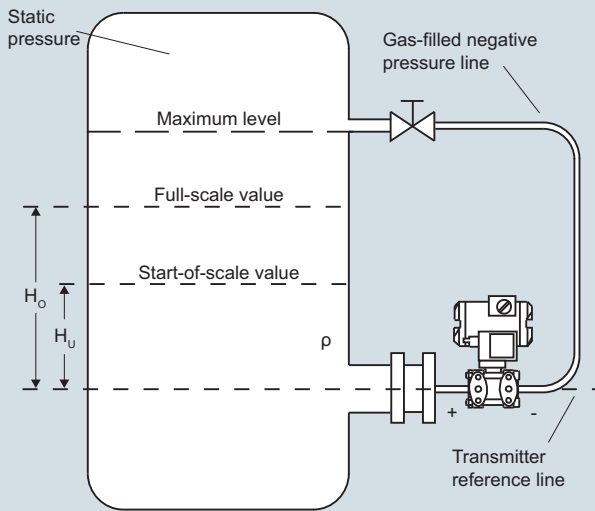


Pressure Measurement

Remote seals for transmitters and pressure gauges

Measuring setups without remote seals

Measuring setups for closed containers



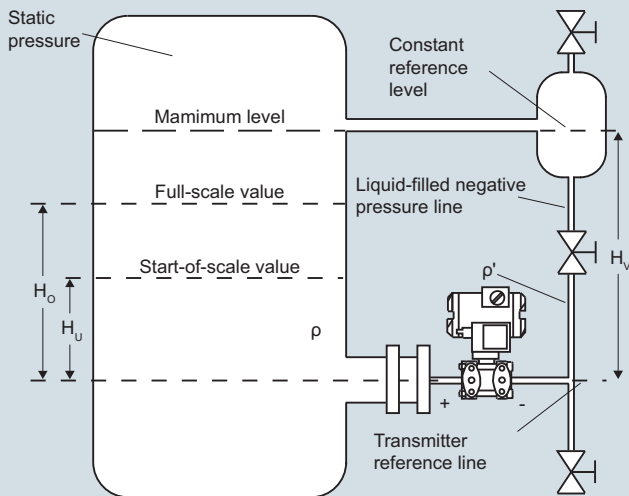
Level measurement, Version 1

Start-of-scale: $\Delta p_{MA} = \rho \cdot g \cdot H_U$

Full-scale: $\Delta p_{ME} = \rho \cdot g \cdot H_O$

Legend

- Δp_{MA} Start-of-scale value to be set
- Δp_{ME} Full-scale value to be set
- ρ Density of medium in vessel
- g Local acceleration due to gravity
- H_U Start-of-scale value
- H_O Full-scale value



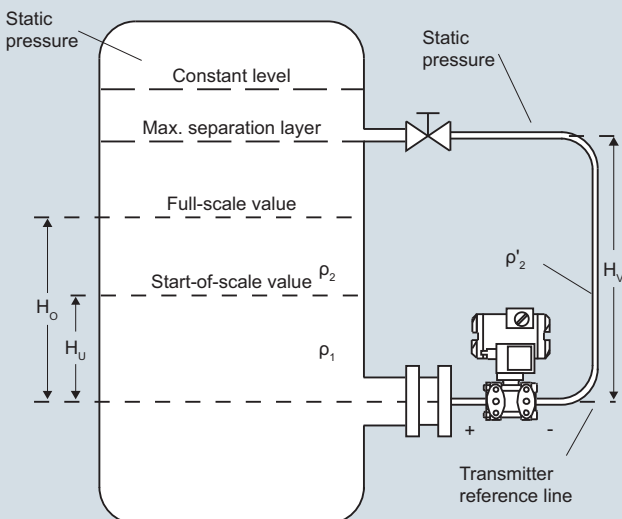
Level measurement, Version 2

Start-of-scale: $\Delta p_{MA} = g \cdot (H_U \cdot \rho - H_V \cdot \rho')$

Full-scale: $\Delta p_{ME} = g \cdot (H_O \cdot \rho - H_V \cdot \rho')$

Legend

- Δp_{MA} Start-of-scale value to be set
- Δp_{ME} Full-scale value to be set
- ρ Density of medium in vessel
- ρ' Density of liquid in the negative pressure line (corresponding to the temperature existing there)
- g Local acceleration due to gravity
- H_U Start-of-scale value
- H_O Full-scale value
- H_V Distance between the measuring points (spigots)



Separation layer measurement

Start-of-scale: $\Delta p_{MA} = g \cdot (H_U \cdot \rho_1 + (H_O - H_U) \cdot \rho_2 - H_V \cdot \rho'_2)$

Full-scale: $\Delta p_{ME} = g \cdot (H_O \cdot \rho_1 - H_V \cdot \rho'_2)$

Legend

- Δp_{MA} Start-of-scale value to be set
- Δp_{ME} Full-scale value to be set
- ρ_1 Density of heavier liquid with separation layer in vessel
- ρ_2 Density of lighter liquid with separation layer
- ρ'_2 Density of liquid in the negative pressure line (corresponding to the temperature existing there)
- g Local acceleration due to gravity
- H_U Start-of-scale value
- H_O Full-scale value
- H_V Distance between the measuring points (spigots)

Checking of transmitter/remote seal combinations

1

* Customer: _____ Tag. No.: _____
 * Plant: _____ Item No.: _____
 * Ordering code: _____ Person responsible: _____
 * Ordering department: _____ Phone: _____
 * Transmitter Article No. SITRANS P DSIII/P300: 7MF -1 Y -1
 * Transmitter Article No. SITRANS P500: 7MF5 - 0 -Z V00

Article No. of diaphragm seal known?

Yes

No

* Article No. of remote seal:
 7MF 4 9 ---Z
 Suffixes _____
 Suffixes _____

* Or without Article No.: Process connection

* Standard: _____
 * Nominal diameter: _____
 * Nominal pressure: _____
 * Constructional design: Sandwich-type rem. seal
 Flanged remote seal
 Quick-release remote seal
 Clamp-on seal
 Other.: _____

* Connection: Direct connection
 Capillary on one side; connection to:
 + side - side
 Capillaries on both sides;
 Capillary length: ___ m
 Yes No

* Vacuum-proof design
 * Wetted parts materials: _____
 * Tube: No Yes, ___mm long
 * Filling liquid _____
 * Miscellaneous _____

Calculation of measuring range necessary?

No

Yes

* Range to be set:
 (without calculation)
Start-of-scale: _____ mbar (4 mA)
Full-scale: _____ mbar (20 mA)
 * Required measuring accuracy:
Error: < . % of set span per 10 V change in temperature

Please fill in this questionnaire and enclose with every order!
 *) Values must be entered here!

Medium _____
Density of medium: _____ kg/m³
 * **Temperature of medium:** Normal _____ °C
 Minimum _____ °C
 Maximum _____ °C
 * **Ambient temperature on capillaries:** Normal _____ °C
 Minimum _____ °C
 Maximum _____ °C
 * **Ambient temperature on transmitter:** Normal _____ °C
 Minimum _____ °C
 Maximum _____ °C
 * **Operating pressure referred to absolute zero:** ___ bar a
 * Does a **vacuum** occur **during startup?** No Yes
 If yes, associated temperature of medium: _____ °C
 * **Installation type**, see pages 1/251 and 1/252 A B C₁ C₂ D
 E G H J
 * **Measuring:** With install. types A, B, C₁, C₂ and D: from ___ to ___ mbar
range With install. types A, B, G, H and J: H_U = ___ mm; H_O = ___ mm
 * **Dimensions:** With install. types A, B, C₁ and C₂: H₁ = ___ mm
 With install. types D, G, H and J: H_V = ___ mm
 * **Start-of-scale value following calculation:** _____ mbar (4 mA)
Full-scale value following calculation: _____ mbar (20 mA)
Associated span: _____ mbar
Error to be expected: < . % of set span per 10 K change in temperature

Checked: Name: _____
 Department: _____
 Date: _____

1

Order date: _____

Processing date: _____

Ordering code (customer): _____

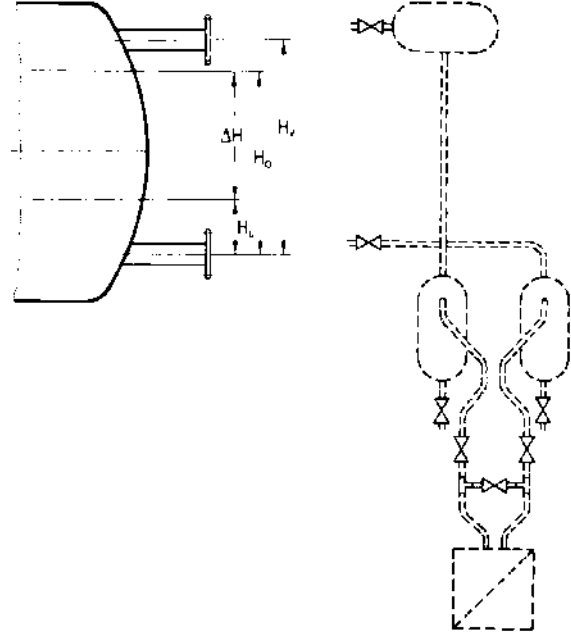
Ordering code (supplier): _____

Customer reference: _____

Measuring point: _____

Position: _____

Dimensions: _____

Pressure: barTemperature: K °CMeasuring range: cm m
(please mark with cross)Article No. of transmitter SITRANS P DS III/P300¹⁾:**7 M F 4** | | | | | - | | | | | - | | | | | - **Z****Y01**Article No. of transmitter SITRANS P500¹⁾:**7 M F 5** | | | | | - | | | | | **0**

The different pressures and temperatures (densities) in the vessel and in the reference column result in an offset in the start-of-scale and full-scale values.

The calibration data are determined in addition.

It is also checked whether – as a result of the range offset – the ordered transmitter is suitable for this measurement.

Please supply the following characteristic data so that we can calculate the measuring range, start-of-scale value, full-scale value and calibration data:

Please mark type of boiler with a cross:		Closed ¹⁾	<input type="checkbox"/>
		Open or not under pressure ²⁾	<input type="checkbox"/>
Medium _____			
Licensed boiler pressure (absolute)			_____ bar
Operating pressure (absolute)		Lowest	_____ bar
		Normal ³⁾	_____ bar
		Highest	_____ bar
Temperature of reference column (cold)			_____ K
Distance between measuring points (dimension according to sketch) H_V			= _____ m
Measuring range ⁴⁾ = start-of-scale value to full-scale value			
		Start-of-scale value	H_U = _____ m
		Full-scale value	H_O = _____ m
Position of equalizing vessel above bottom measuring point if different from H_V			_____ m
Please mark pressure correction of level with a cross:		No	<input type="checkbox"/>
		Yes ⁴⁾	<input type="checkbox"/>

¹⁾ Reference line filled with condensation! Falling differential pressure with increasing level.

²⁾ Reference line without gas or filled with gas (air). Rising differential pressure with increasing level.

³⁾ If not specified otherwise, this value is assumed as the calculation pressure of the level meter.

The input signal (differential pressure) depends on the density (pressure and temperature). The influence is practically negligible for a lowest liquid level of 20 to 30% of the distance between the measuring points.

⁴⁾ If a pressure correction of the level is required, the **measuring range must be the same as the distance between the measuring points**, and the transmitter is designed for the calculation pressure of 1 bar (absolute). Pressure correction means: the static pressure and the temperature are measured separately and calculated by a correction computer or measured-value computer.

* Customer: _____ Tag. No.: _____
 * Plant: _____ Item No.: _____
 * Ordering code: _____ Person responsible: _____
 * Ordering department: _____ Phone: _____
 * Transmitter Article No. SITRANS P DS III/P300: 7MF □□□□-1 □ Y □□-1 □□□
 * Transmitter Article No. SITRANS P500: 7MF5 □□□□-□□□□ 0-Z V00

Article No. of diaphragm seal known?

Yes

No

* Article No. of remote seal:
 7MF 4 9 □□-□□□□□-□□-**Z**
 Suffixes _____
 Suffixes _____

* Or without Article No.: Process connection

* Standard: _____
 * Nominal diameter: _____
 * Nominal pressure: _____
 * Constructional design: Sandwich-type rem. seal
 Flanged remote seal
 Quick-release remote seal
 Clamp-on seal
 Other.: _____
 * Connection: Direct connection
 Capillary on one side; connection to:
 + side - side
 Capillaries on both sides;
 Capillary length: ___ ft
 Yes No
 * Vacuum-proof design _____
 * Wetted parts materials: _____
 * Tube: No Yes, ___ inch long
 * Filling liquid _____
 * Miscellaneous _____

Calculation of measuring range necessary?

No

Yes

* Range to be set:
 (without calculation)
Start-of-scale: _____ psi (4 mA)
Full-scale: _____ psi (20 mA)
 * Required measuring accuracy:
Error: < . % of set span per 18 °F change in temperature

Medium _____
Density of medium: _____ kg/m³
 * **Temperature of medium:** Normal _____ °F
 Minimum _____ °F
 Maximum _____ °F
 * **Ambient temperature on capillaries:** Normal _____ °F
 Minimum _____ °F
 Maximum _____ °F
 * **Ambient temperature on transmitter:** Normal _____ °F
 Minimum _____ °F
 Maximum _____ °F
 * **Operating pressure referred to absolute zero:** _____ psi_{abs}
 * Does a **vacuum** occur **during startup**? No Yes
 If yes, associated temperature of medium: _____ °F
 * **Installation type**, see pages 1/251 and 1/252 A B C₁ C₂ D
 E G H J
 * **Measuring:** With install. types A, B, C₁, C₂ and D: from ___ to ___ psi
range With install. types A, B, G, H and J: H_U = ___ inch; H_O = ___ inch
 * **Dimensions:** With install. types A, B, C₁ and C₂: H₁ = ___ inch
 With install. types D, G, H and J: H_V = ___ inch
 * **Start-of-scale value following calculation:** _____ psi (4 mA)
Full-scale value following calculation: _____ psi (20 mA)
Associated span: _____ psi
Error to be expected: < . % of set span per 18 °F change in temperature

Please fill in this questionnaire and enclose with every order!
 *) Values must be entered here!

Checked: Name: _____
 Department: _____
 Date: _____

Pressure Measurement

Fittings

Technical description

Overview

All shut-off fittings can be secured onto walls, racks (72 mm grid) and vertical and horizontal pipes.

This offers the advantage when assembling a plant that the shut-off fittings can be secured first and the lines for the medium and differential pressure connected to them. It is then possible to check all connections for leaks and to blow out or flush the pipes in order to remove dirt (welding residues, shavings etc.).

The measuring instruments can be screwed onto the shut-off fittings right at the end when all piping has been completed.

If an instrument has to be removed for maintenance, the fittings and pipes remain as they are. It is only necessary to close the valves – the instrument can then be removed, and refitted following maintenance.

Classification according to pressure equipment directive (PED 97/23/EC):

For gases of fluid group 1 and liquids of fluid group 1; compliance with requirements of article 3, paragraph 3 (sound engineering practice).

New standard IEC 61518

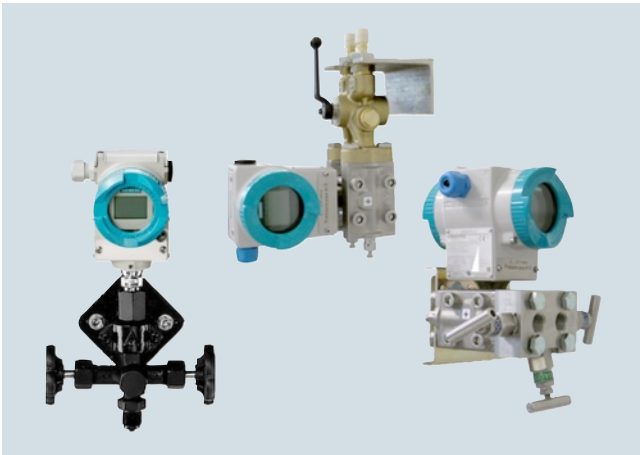
The flange connection between transmitter and valve manifold was modified in the new standard IEC 61518. The only connection thread approved for use in the process flanges of the pressure transmitter is $7/16$ -20 UNF.

The valve manifolds for M12 screws, including the accessory sets, have therefore been deleted.

Material acceptance test certificate to EN 10204-3.1

If a material acceptance test certificate to EN 10204-3.1 is required when ordering valve manifolds or shut-off fittings, please note that a single certificate is sufficient for each ordered item type. This means that you will only be charged for one certificate in the cost calculations.

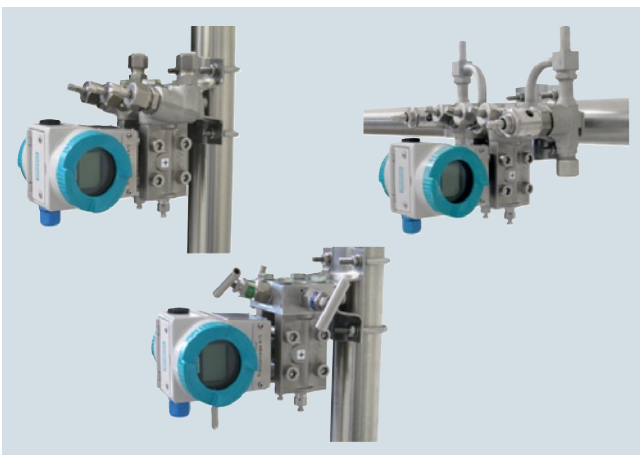
Pressure transmitters with shut-off fittings - mounting examples



SITRANS P transmitter for gauge pressure with double shut-off valve, SITRANS P pressure transmitter with multiway cock or 3-spindle valve manifold



SITRANS P pressure transmitter for differential pressure, mounted in protective box (available on request)





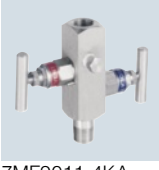


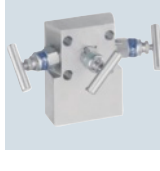


SITRANS P transmitter for differential pressure with 3-way valve manifold, 3-spindle valve manifold or valve manifold combination DN 5/DN 8



SITRANS P pressure transmitter mounted on valve combination "Mono-flange" for direct connection to flanges (available on request)

Selection of available shut-off valves

Transmitters	Shut-off valves for general applications	Page		Shut-off valves for special applications	Page	
Relative and absolute pressure transmitters with process connection G$\frac{1}{2}$" male thread e.g. <ul style="list-style-type: none"> • SITRANS P200 7MF1565-... • SITRANS P210 7MF1566-... • SITRANS P220 7MF1567-... • SITRANS P300 7MF802-...0-.... • SITRANS P DS III series 7MF403-...0-.... and 7MF423-...0-.... 	Shut-off valves/double shut-off valves to DIN 16270, DIN 16271 and DIN 16272	1/261		Double shut-off valve DN 5 for crossover $\frac{1}{2}$ -NPT-F to G $\frac{1}{2}$ nipple connection 7MF9011-4EA	1/264	
				2-spindle valve manifold DN 5 for installation in protective boxes 7MF9412-1B	1/282	
Relative and absolute pressure transmitter with $\frac{1}{2}$"-14 NPT female thread e.g. <ul style="list-style-type: none"> • SITRANS P200 7MF1565-... • SITRANS P210 7MF1566-... • SITRANS P220 7MF1567-... • SITRANS P300 7MF802-...1-.... • SITRANS P DS III series 7MF403-...1-.... and 7MF423-...1-.... 	Double shut-off valve DN 5 7MF9011-4EA, -4FA, -4GA and -4KA	1/264	 7MF9011-4FA  7MF9011-4KA	Double shut-off valve DN 5 for process connection $\frac{1}{2}$ -NPT 7MF9011-4HA	1/264	
Absolute pressure transmitter with process connection to IEC 61518 e.g. <ul style="list-style-type: none"> • SITRANS P DS III series 7MF433-.... 	2-spindle valve manifold DN 5 7MF9411-5A.	1/267		2-spindle valve manifold DN 5 for installation in protective boxes 7MF9412-1C.	1/282	

Pressure Measurement

Fittings

Selection aid

Transmitters	Shut-off valves for general applications	Page	Shut-off valves for special applications	Page		
Differential pressure transmitter with process connection to IEC 61518 e.g. SITRANS P DS III series 7MF443-... and 7MF453-... SITRANS P500 7MF54-...	For 3/5-spindle valve manifold DN 5 7MF9411-5B. and 7MF9411-5C.	1/267	3-way valve manifolds, DN 5, forged version 7MF9410-1..	1/272		
			5-way valve manifolds, DN 5, forged version 7MF9410-3..	1/272		
	PN 100 multiway cocks 7MF9004-...		1/270	3-way valve manifolds, DN 8, forged version 7MF9416-1.. and 7MF9416-2..	1/275	
				Valve manifold combina- tion DN 5/DN 8 for vapor measurement 7MF9416-6..	1/278	
				Valve manifold combina- tion DN 8 for vapor mea- surement 7MF9416-4..	1/280	
				3- and 5-spindle valve manifolds for DN 5 for installation in protective boxes 7MF9412-1D. and 7MF9412-1E.	1/282	
				3- and 5-spindle valve manifolds for vertical dif- ferential pressure lines 7MF9413-1..	1/286	
				Low-pressure multiway cock 7MF9004-4..	1/289	

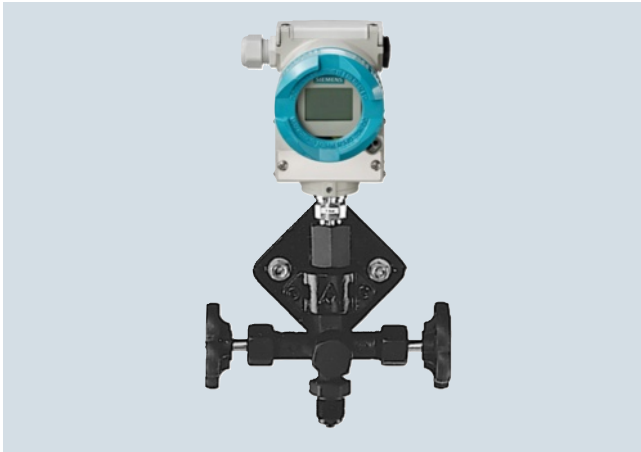
Pressure Measurement

Fittings - Shut-off valves for gauge and absolute pressure transmitters

Shut-off valves to DIN 16270, DIN 16271 and DIN 16272

1

Overview



Transmitter for pressure with double shut-off valve 7MF9401-...

The shut-off valves for pressure gauges are used to shut off the line of the measured medium when dealing with aggressive and non-aggressive gases, vapors and liquids.

Design

A water trap must be connected upstream of the shut-off valve in the case of temperatures of the medium above 120 °C. The shut-off valves form B have a shaft with which they can be secured on an instrument bracket. An adapter is therefore not required to secure these valves. The vent/test connection can be shut off separately with the double shut-off valves DN 5. This permits checking of the zero on the pressure gauge. In addition, the characteristic of the pressure gauge can be checked using an external pressure source.

Selection and Ordering data

Article No.

Shut-off valves, form B, DIN 16270

without test collar, connection shank,
without certificate

Material Valve housing	Maximum permissible working pressure	Article No.
CW614N (CuZn39Pb3)250 bar (3626 psi) (mat. No. 2.0402)		7MF9401-7AA
P250GH (mat. No. 1.0460)	400 bar (5800 psi)	7MF9401-7AB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	400 bar (5800 psi)	7MF9401-7AC

Shut-off valves, form B, DIN 16271

with test collar, connection shank,
without certificate

Material Valve housing	Maximum permissible working pressure	Article No.
CW614N (CuZn39Pb3)250 bar (3626 psi) (mat. No. 2.0402)		7MF9401-7BA
P250GH (mat. No. 1.0460)	400 bar (5800 psi)	7MF9401-7BB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	400 bar (5800 psi)	7MF9401-7BC

Selection and Ordering data

Article No.

Shut-off valves, form B, DIN 16270

without test collar, pipe union with ferrule
12 S DIN EN ISO 8434-1, without certificate

Material Valve housing	Maximum permissible working pressure	Article No.
P250GH (mat. No. 1.0460)	400 bar (5800 psi)	7MF9401-8AB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	400 bar (5800 psi)	7MF9401-8AC

Shut-off valves, form B, DIN 16271

with test collar, pipe union with ferrule
12 S DIN EN ISO 8434-1, without certificate

Material Valve housing	Maximum permissible working pressure	Article No.
P250GH (mat. No. 1.0460)	400 bar (5800 psi)	7MF9401-8BB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	400 bar (5800 psi)	7MF9401-8BC

Double shut-off valves, form B, DIN 16272

with test collar, connection shank,
without certificate

Material Valve housing	Maximum permissible working pressure	Article No.
CW614N (CuZn39Pb3)250 bar (3626 psi) (mat. No. 2.0402)		7MF9401-7DA
P250GH (mat. No. 1.0460)	400 bar (5800 psi)	7MF9401-7DB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	400 bar (5800 psi)	7MF9401-7DC

Double shut-off valves, form B, DIN 16272

with test collar, pipe union with ferrule
12 S DIN EN ISO 8434-1, without certificate

Material Valve housing	Maximum permissible working pressure	Article No.
P250GH (mat. No. 1.0460)	400 bar (5800 psi)	7MF9401-8DB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	400 bar (5800 psi)	7MF9401-8DC

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate
EN 10204-3.1

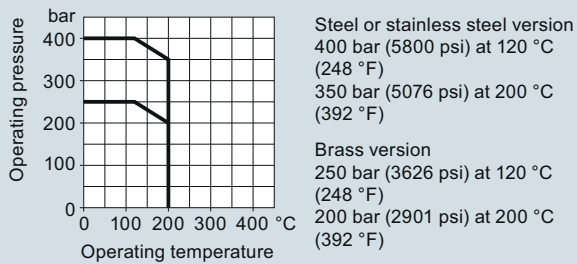
Instrument bracket, see page 1/266.

Pressure Measurement

Fittings - Shut-off valves for gauge and absolute pressure transmitters

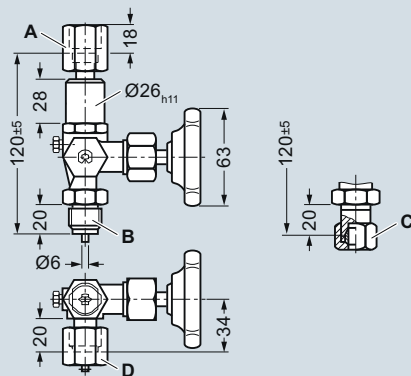
Shut-off valves to DIN 16270, DIN 16271 and DIN 16272

Characteristic curves



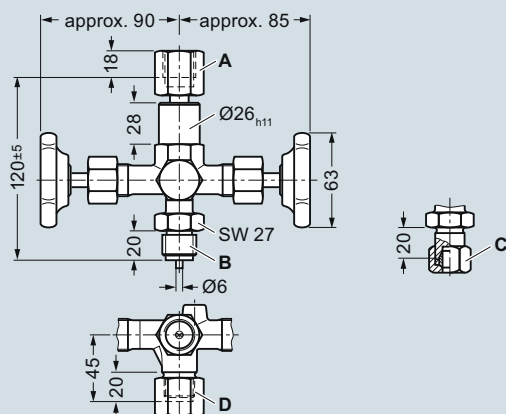
Permissible operating pressure as a function of the permissible operating temperature

Dimensional drawings



- A Connection on device side: to DIN 16284, G $\frac{1}{2}$, SW 27
- B Connection on measurement side: connection shank to DIN EN 837-1, G $\frac{1}{2}$
- C Connection on measurement side: pipe union with ferrule 12 mm diameter, S series, to DIN EN ISO 8434-1
- D Connection on test collar (with sealing cap): thread M20 x 1,5

Shut-off valve, form B, dimension drawing, dimensions in mm



- A Connection on device side: to DIN 16284, G $\frac{1}{2}$, SW 27
- B Connection on measurement side: connection shank to DIN EN 837-1, G $\frac{1}{2}$
- C Connection on measurement side: pipe union with ferrule 12 mm diameter, S series, to DIN EN ISO 8434-1
- D Connection on test collar (with sealing cap): thread M20 x 1,5

Double shut-off valve, form B, dimension drawing, dimensions in mm

Pressure Measurement

Fittings - Shut-off valves for gauge and absolute pressure transmitters

Angle adapter

1

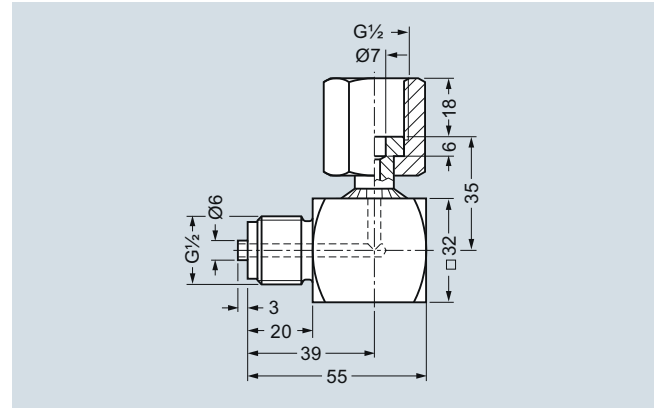
Overview



P300 pressure transmitter with shut-off valve and angle adapter

The angle adapter enables pressure transmitters with top displays to be read from the front.

Dimensional drawings



Angle adapter, dimensions in mm

Selection and Ordering data

Article No.

Angle adapters

7MF9401-7WA

Material: X 12 CrNiMoTi 17 12 2 (mat. No. 1.45714/316Ti), max. permissible operating pressure 400 bar (5800 psi)

Accessories

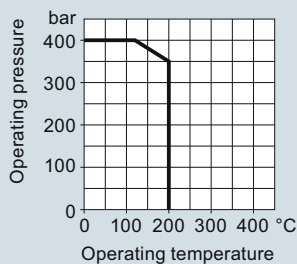
Factory test certificate EN 10204-2.2

7MF9000-8AB

Material acceptance test certificate EN 10204-3.1

7MF9000-8AD

Characteristic curves



Stainless steel version
400 bar (5800 psi) at 120 °C
(248 °F)
350 bar (5076 psi) at 200 °C
(392 °F)

Permissible operating overpressure as a function of the permissible operating temperature

Pressure Measurement

Fittings - Shut-off valves for gauge and absolute pressure transmitters

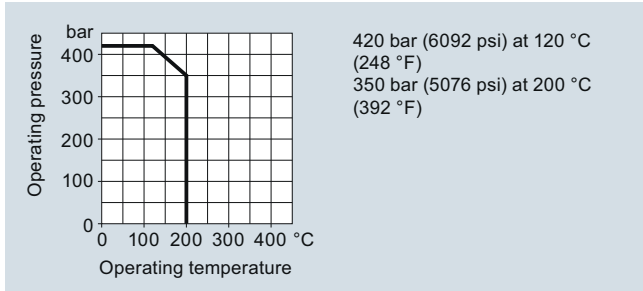
Double shut-off valves

Overview

The double shut-off valves DN 5 are suitable for pressure gauges and pressure transmitters and available in 5 versions:

- Sleeve-nipple
- Sleeve-sleeve
- Sleeve-collar
- Collar-collar
- Collar-sleeve

Characteristic curves



Permissible operating pressure as a function of the permissible operating temperature

Selection and Ordering data

Double shut-off valves DN 5

Material: X 6 CrNiMoTi 17 13 2 (mat. No. 1.4404/316L), max. permissible working pressure 420 bar (6092 psi);

- Sleeve-nipple connection
- Sleeve-sleeve
- Sleeve-collar
- Collar-collar
- Collar-sleeve

Article No.

7MF9011-4EA
7MF9011-4HA
7MF9011-4FA
7MF9011-4GA
7MF9011-4KA

Accessories

Factory test certificate EN 10204-2.2

7MF9000-8AB

Material acceptance test certificate EN 10204-3.1

7MF9000-8AD

Further designs

Order code

Add "-Z" to Article No. and specify Order code.

Oil- and grease-free cleaning for oxygen applications, max. pressure PN 100 (1450 psi) and max. temperature 60 °C (140 °F)

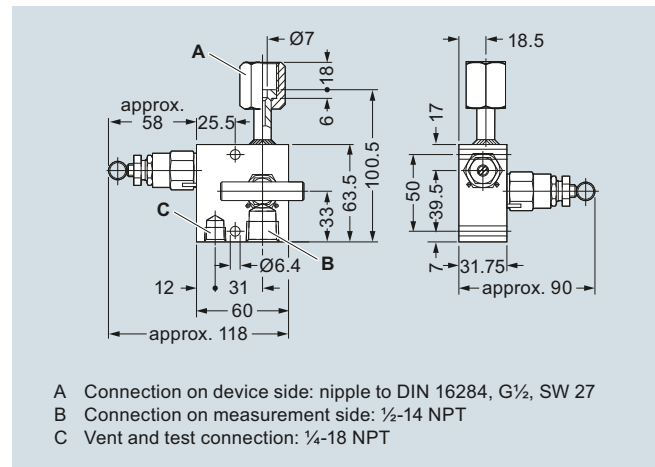
S12

NACE MR-0175-certified

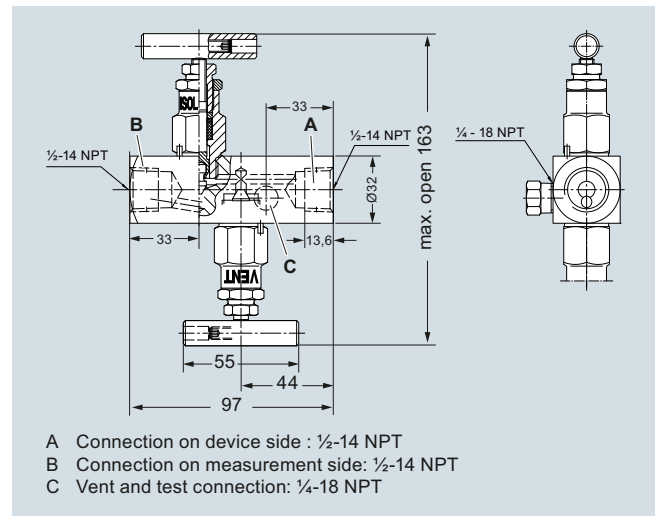
D07

incl. acceptance test certificate 3.1 to EN 10204

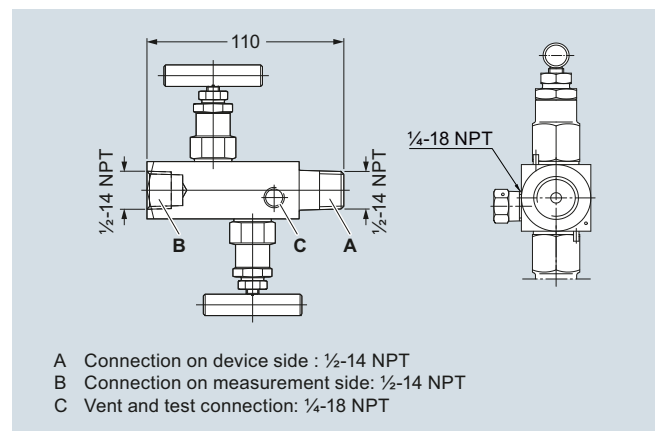
Dimensional drawings



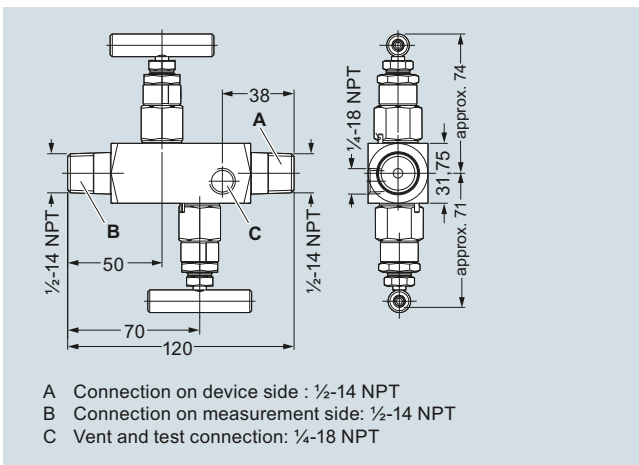
Double shut-off valve DN 5 (sleeve-nipple) 7MF9011-4EA, dimensions in mm



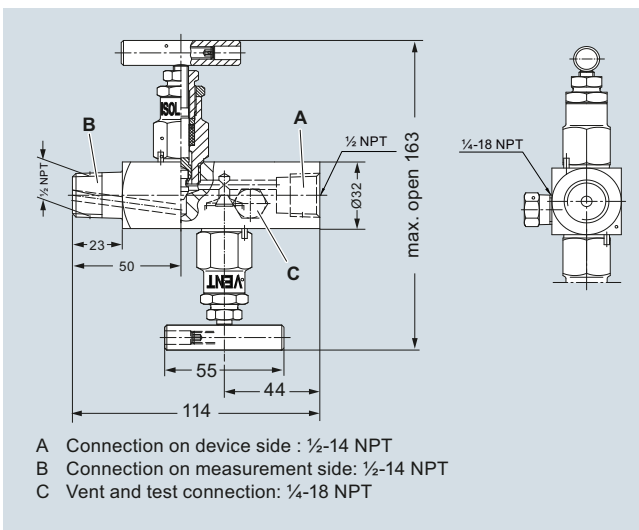
Double shut-off valve DN 5 (sleeve-sleeve) 7MF9011-4HA, dimensions in mm



Double shut-off valve DN 5 (sleeve-collar) 7MF9011-4FA, dimensions in mm



Double shut-off valve DN 5 (collar-collar) 7MF9011-4GA,
 dimensions in mm



Double shut-off valve DN 5 (collar-sleeve) 7MF9011-4KA,
 dimensions in mm

Pressure Measurement

Fittings - Shut-off valves for gauge and absolute pressure transmitters

Accessories for shut-off valves/double shut-off valves

Overview

The mounting set is suitable for the double shut-off valves 7MF9011-4.A and for wall, rack and pipe mounting.

Selection and Ordering data

Article No.

Mounting set for shut-off valves

- 7MF9011-4DA und -4EA

made of stainless steel, scope of delivery:
1x mounting bracket,
2x hexagon screws M6x40,
1x mounting clip,
2x washers 8.4 to DIN 125;
2x hexagon nuts 8.4 to DIN EN 24032

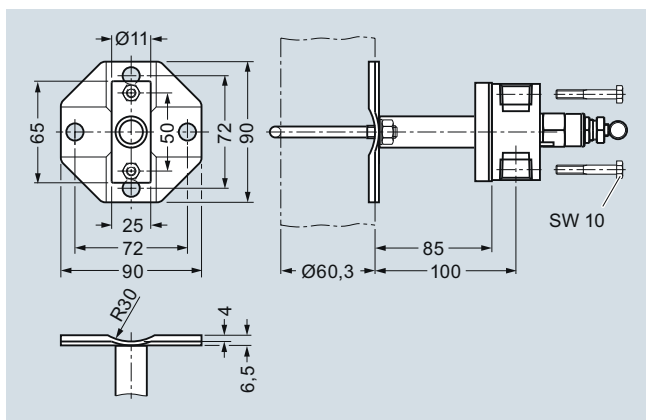
7MF9011-8AB

- 7MF9011-4FA und -4GA

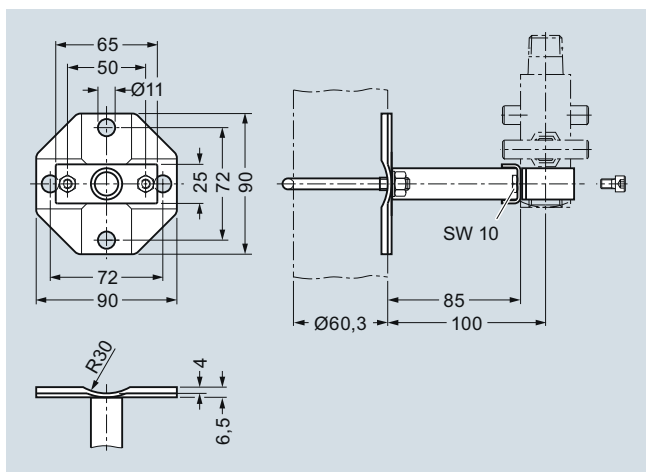
made of stainless steel, scope of delivery:
1x mounting bracket,
2x hexagon screws M6x10,
1x mounting clip,
2x washers 8.4 to DIN 125;
2x hexagon nuts 8.4 to DIN EN 24032

7MF9011-8AC

Dimensional drawings



Mounting bracket (7MF9011-8AB) for shut-off valves 7MF9011-4DA and 7MF9011-4EA for wall, rack or pipe mounting, dimensions in mm



Mounting bracket (7MF9011-8AC) for shut-off valves 7MF9011-4FA and 7MF9011-4GA for wall, rack or pipe mounting, dimensions in mm

Overview

The instrument brackets are needed to mount the following units:

- Pressure gauges with threaded connection at the bottom
- Shut-off valves to DIN 16270, DIN 16271 and DIN 16272 (7MF9401-7.. and 7MF9401-8..)

Selection and Ordering data

Article No.

Instrument bracket, form H, DIN 16281

(e.g. for gauge)
made of aluminium alloy, painted black,
for wall mounting, screw-type bracket cover

- Projection length 60 mm
- Projection length 100 mm

M56340-A0046
M56340-A0047

Instrument bracket, form A, DIN 16281

(e.g. for transmitter)
made of annealed cast iron, galvanized and primed
for mounting on a wall or rack or on a sectional rail (horizontal/vertical);
Screw-type bracket cover

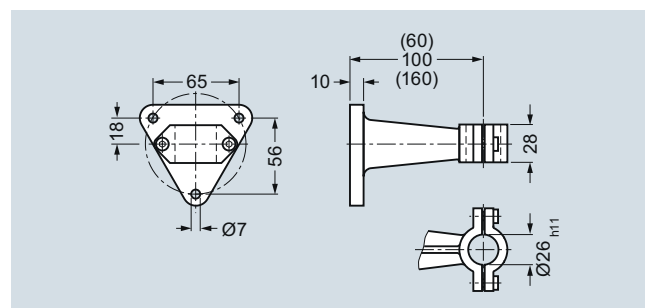
M56340-A0053

Instrument bracket, form A, DIN 16281

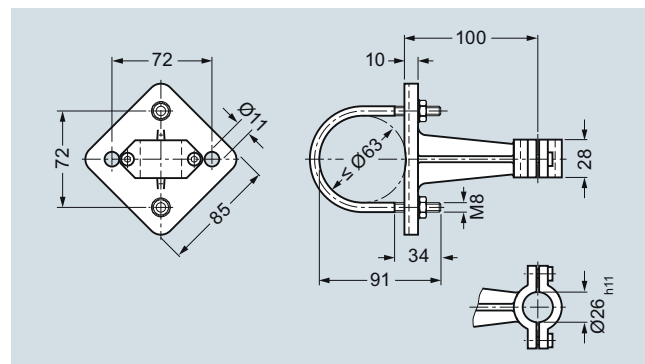
(e.g. for transmitter)
made of annealed cast iron, galvanized and primed with pipe clamp for **wall and pipe mounting** (horizontal/vertical)
Screw-type bracket cover

M56340-A0079

Dimensional drawings



Instrument bracket form H, for wall mounting, M56340-A0046/-A0047, dimensions in mm



Instrument bracket form A, wall or pipe mounting, M56340-A0053/-A0079, dimensions in mm

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

2-, 3- and 5-spindle valve manifolds DN 5

1

Overview



The 2-spindle, 3-spindle and 5-spindle valve manifolds 7MF9411-5.. are for pressure transmitters for absolute pressure or differential pressure.

The valve manifolds are used to shut off the differential pressure lines and to check the pressure transmitter zero.

The 2-spindle and the 5-spindle valve manifold enable in addition venting on the transmitter side and checking of the pressure transmitter characteristic.

Benefits

- Max. working pressure 420 bar (6092 psi)
- Each available in version for oxygen

Application

The spindle valve manifolds DN 5 are designed for liquids and gases.

Each is available in a version for oxygen on request.

Design

All versions of the valve manifolds have a process connection 1/2-14 NPT. The connection for the pressure transmitter is always designed as a flange connection to IEC 61518, form B. The 2-spindle and the 5-spindle valve manifold have in addition a vent and test connection 1/4-18 NPT.

The valves have an external spindle thread.

Materials used

Component	Material	Mat. No.
Housing	X 2 CrNiMo 17 13 2	1.4404/316L
Cones	X 6 CrNiMoTi 17 12 2	1.4571/316Ti
Spindles	X 2 CrNiMo 18 10	1.4404/316L
Head parts	X 5 CrNiMo 18 10	1.4401/316
Packings	PTFE	-

Function

Functions of all valve manifolds:

- Shutting off the differential pressure lines
- Checking the pressure transmitter zero

Additional functions of the 2-spindle and 5-spindle valve manifolds through the vent and test connection:

- Venting on the transmitter side
- Checking the pressure transmitter characteristic

Selection and Ordering data

Valve manifolds DN 5

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

for liquids and gases, for flanging to pressure transmitters for absolute and differential pressure, max. working pressure 420 bar (order accessory set with Order code), without certificate

- 2-spindle valve manifold
- 3-spindle valve manifold
- 5-spindle valve manifold

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

Article No.

7MF9411 - A

A

5 A

5 B

5 C

Selection and Ordering data

Order code

Article No.

Further designs¹⁾

Please add **"-Z"** to Article No. and specify Order code.

Accessory set to EN

(connection between valve manifold and pressure transmitter)

for valve manifold 7MF9411-5A.

2x screws 7/16-20 UNF x 1 3/4 inch to ASME B18.2.1; chromized steel
1x gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K35

7MF9411-7DB

2x screws 7/16-20 UNF x 1 3/4 inch to ASME B18.2.1;

stainless steel

1x gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K45

7MF9411-7DC

for valve manifold 7MF9411-5B. and -5C.

4x screws 7/16-20 UNF x 1 3/4 inch to ASME B18.2.1; chromized steel
2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K36

7MF9411-5DB

4x screws 7/16-20 UNF x 1 3/4 inch to ASME B18.2.1;

stainless steel

2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K46

7MF9411-5DC

Accessory set to DIN²⁾

(connection between valve manifold and pressure transmitter)

for valve manifold 7MF9411-5A.

2x screws M10x45 to DIN EN 24014; chromized steel
2x washers Ø 10.5 mm to DIN 125;
1x gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K15

7MF9411-7BB

2x screws M10x45 to DIN EN 24014;

stainless steel

2x washers Ø 10.5 mm to DIN 125, stainless steel;
1x gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K25

7MF9411-7BC

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

2-, 3- and 5-spindle valve manifolds DN 5

1

Selection and Ordering data	Order code	Article No.
Further designs¹⁾		
Please add "-Z" to Article No. and specify Order code. <u>for valve manifolds 7MF9411-5B. and -5C.</u> 4x screws M10x45 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F) Flange connection with M10 screws only permissible up to PN 160.	K16	7MF9411-6BB
4x screws M10x45 to DIN EN 24014; stainless steel 4x washers Ø 10.5 mm to DIN 125, stainless steel ; 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F) Flange connection with M10 screws only permissible up to PN 160.	K26	7MF9411-6BC
Mounting plate		
• for valve manifold, made of electrogalvanized sheet-steel - for wall mounting or for securing on rack (72 mm grid), weight 0.5 kg Scope of delivery: 1 mounting plate with bolts for mounting on valve manifold	M11	7MF9006-6EA
- for pipe mounting , weight 0.7 kg Scope of delivery: 1x mounting plate M11, 2x pipe brackets with nuts and washers (for pipe with max. Ø 60.3 mm) and fastening screws for mounting on valve manifold	M12	7MF9006-6GA
• for valve manifold, made of stainless steel - for wall mounting or for securing on rack (72 mm grid), weight 0.5 kg Scope of delivery: 1 mounting plate with bolts for mounting on valve manifold	M21	7MF9006-6EC
- for pipe mounting , weight 0.7 kg Scope of delivery: 1x mounting plate M21, 2x pipe brackets with nuts and washers (for pipe with max. Ø 60.3 mm)	M22	7MF9006-6GC
Valve manifold 100 bar		
Oil- and grease-free cleaning for oxygen applications, max. pressure PN 100 (1450 psi) and max. temperature 60 °C (140 °F) • for 7MF9411-5A. • for 7MF9411-5B. • for 7MF9411-5C.	S12 S13 S14	
NACE MR-0175-certified		
incl. acceptance test certificate 3.1 to EN 10204	D07	

Accessories

Accessory set for 2-, 3- and 5-spindle valve manifolds

2-spindle valve manifold DN 5

- K35: 2 screws $\frac{7}{16}$ -20 UNF x 1¾ inch to ASME B18.2.1, 1 flat gasket
- K15: 2 screws M10x45 to DIN EN 24014, 2 washers, 1 flat gasket

3-spindle and 5-way valve manifold DN 5

- K36: 4 screws $\frac{7}{16}$ -20 UNF x 1¾ inch to ASME B18.2.1, 2 flat gaskets
- K16: 4 screws M10x45 to DIN EN 24014, 4 washers, 2 flat gaskets

Washers Ø 10.5 to DIN 125

Flat gaskets made of PTFE, max. 420 bar (6092 psi), 80 °C (176 °F)

Note: Flange connection with M10 screws only permissible up to PN 160!

Mounting plate

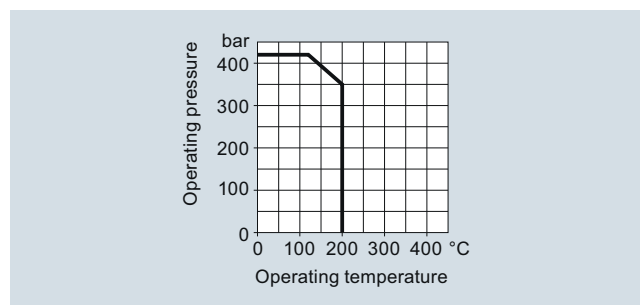
Made of electrogalvanized sheet-steel

- M11: For wall mounting or for securing on rack (72 mm grid)
Scope of delivery:
- 1 mounting plate with bolts for mounting on valve manifold
- M12: For pipe mounting
Scope of delivery:
- 1 mounting plate M11
- 2 pipe brackets with nuts and washers for pipes with max. Ø 60.3 mm

Valve manifold 100 bar, suitable for oxygen

- S12: For 2-way valve manifold
- S13: For 3-way valve manifold
- S14: For 5-way valve manifold

Characteristic curves

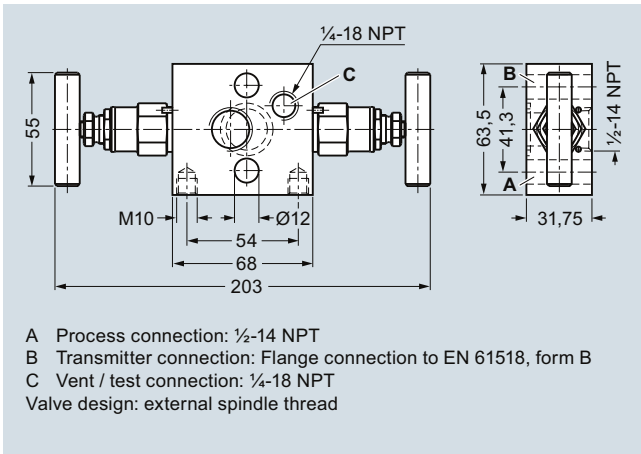


Valve manifolds PN 5 (7MF9411-5..), permissible working pressure as a function of the permissible working temperature

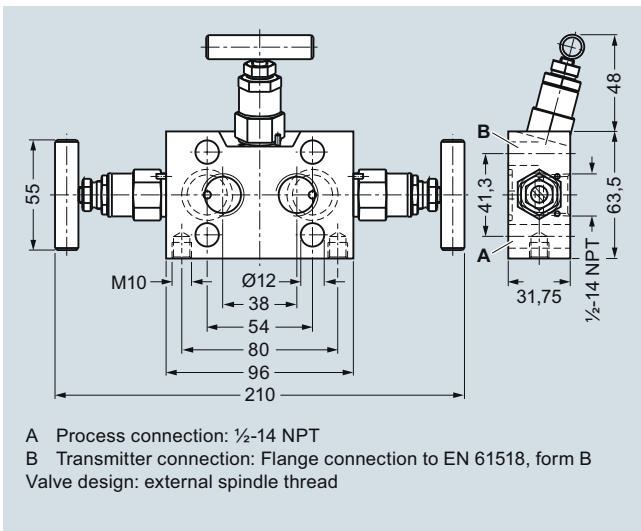
¹⁾ When ordering accessory set or mounting together with the valve manifolds, please use Order code; otherwise use Article No.

²⁾ Flange connections to DIN 19213 only permissible up to PN 160 (2321 psi)!

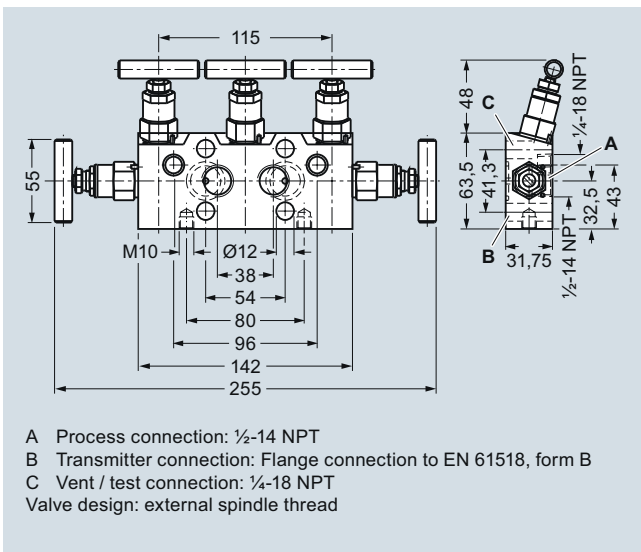
Dimensional drawings



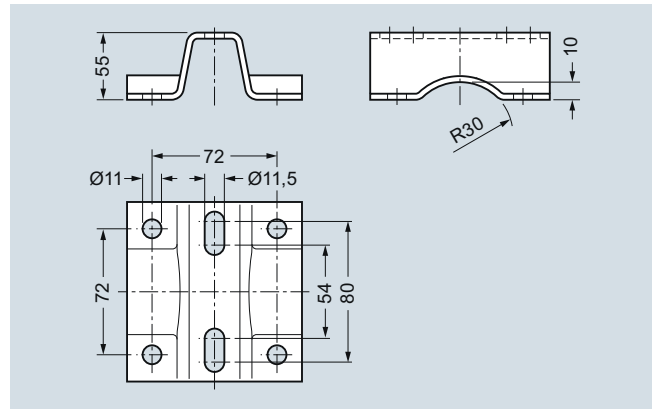
2-spindle valve manifold DN 5 (7MF9411-5A.), dimensions in mm



3-spindle valve manifold DN 5 (7MF9411-5B.), dimensions in mm

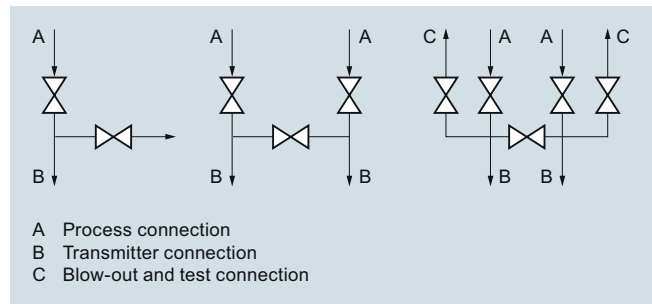


5-spindle valve manifold DN 5 (7MF9411-5C.), dimensions in mm



Mounting plate 7MF9006-6.. (M11, M12) for valve manifold, dimensions in mm

Schematics



2-spindle, 3-spindle and 5-spindle valve manifold DN 5, connections

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

Multiway cocks PN 100

Overview



Multiway cock PN 100 (1450 psi) (7MF9004-1P.) for differential pressure transmitters

The multiway cock PN 100 (1450 psi) can be flanged to pressure transmitters for differential pressure.

Benefits

- Version available for aggressive liquids, gases and vapors
- Robust design
- Oil-free and grease-free version possible
- One-hand operation

Application

The PN 100 (1450 psi) multiway cock is available in versions for aggressive and non-aggressive liquids, gases and vapors.

Design

The multiway cock can be flanged with four screws to pressure transmitters for differential pressure.

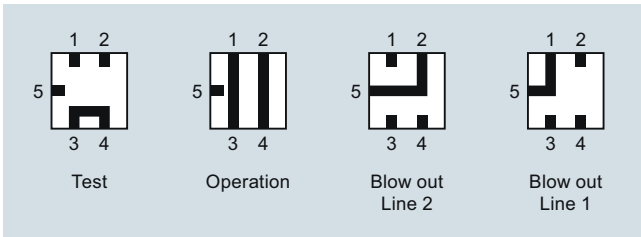
The PN 100 (1450 psi) has 2 process connections and one blow-out connection. A steel version of the multiway cock is available for non-aggressive media, and a stainless steel version for aggressive media. The housing is forged in one piece. The switching lever is removable.

Sealing can be improved during operation.

Note: An accessory set is always required for flanging of the multiway cock to a differential pressure transmitter.

Function

- Shutting off the differential pressure lines
- Blowing out the differential pressure lines
- Testing the pressure transmitter zero



Cock positions; the symbols are printed on the cock

Technical specifications

Multiway cocks PN 100		
Measured medium	Water, non-aggressive liquids and gases	Aggressive liquids, gases and vapors
Material	P250GH, mat. No.: 1.0460	X 6 CrNiMoTi 17 12 2, mat. No. 1.4571/316Ti
Connections	Steel, for pipe Ø 12 mm, L series	Stainless steel, for pipe Ø 12 mm, L series
• Process connection	2 bulkhead glands	
• Connection for blowing out	Pipe union with ferrule	
Max. permissible working temperature	200 °C (392 °F)	
Max. permissible working pressure	100 bar (1450 psi) (up to max. 60 °C (140 °F))	
Weight	2.5 kg	

Selection and Ordering data

Multiway cock PN 100 (1450 psi)	Article No.
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal. for flanging to pressure transmitters, weight 2.5 kg (without accessory set), without certificate For water and non-aggressive gases and vapors For aggressive liquids, gases and vapors	7MF9004-1P 7MF9004-1Q
Accessories	
Factory test certificate EN 10204-2.2 Material acceptance test certificate EN 10204-3.1	7MF9000-8AB 7MF9000-8AD

Selection and Ordering data

Further designs ¹⁾	Order code	Article No.
Please add "-Z" to Article No. and specify Order code.		
Accessory set to EN (required for flanging, weight 0.2 kg) 4x screws $7/16$ -20 UNF x 1 inch to ASME B18.2.1; chromized steel 2x gaskets made of PTFE, max. permissible temperature 80 °C (176 °F)	L31	7MF9004-5CC
Accessory set to DIN (required for flanging, weight 0.2 kg) 4x screws M10x25 to DIN EN 24017; chromized steel, 4x washers Ø 10.5 mm to DIN 125; 2x gaskets made of PTFE, max. permissible temperature 80 °C (176 °F)	L11 L15	7MF9004-6AD 7MF9004-6AE
Multiway cock in oil-free and grease-free design Oil- and grease-free cleaning for oxygen applications, max. pressure PN 100 (1450 psi) and max. temperature 60 °C (140 °F), BAM-tested lubricant, gasket suitable for oxygen measurement (only with Article No. 7MF9004-1Q.Z)	S11	
Mounting bracket Required for wall mounting or for securing on rack (72 mm grid), made of electrogalvanized sheet-steel, weight 0.85 kg	M13	7MF9004-6AA
NACE MR-0175-certified incl. acceptance test certificate 3.1 to EN 10204 (only available for version 7MF9004-1QA)	D07	

¹⁾ When ordering accessory set or mounting together with the multiway cock, please use Order code; otherwise use Article No.

Accessories

Accessory set for multiway cock PN 100

- L31: 4 screws $\frac{7}{16}$ -20 UNF x 1 inch, 2 flat gaskets
- L11: 4 screws M10x25 to DIN EN 24017, 4 washers, 2 flat gaskets
- L15 (suitable for oxygen): 4 screws M10x25 to DIN EN 24017, 4 washers, 2 flat gaskets

Washers \varnothing 10.5 to DIN 125

Flat gaskets made of PTFE, max. permissible temperature 80 °C (176 °F)

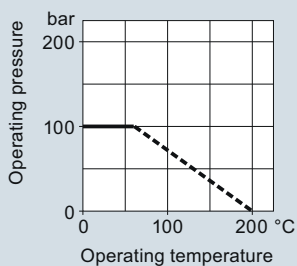
Multiway cock in oil-free and grease-free design

- S11 (only for aggressive liquids, gases and vapors (7MF9004-1Q.)): Max. PN 63 (914 psi) (instead of PN 100 (1450 psi)), BAM-tested lubricant, gasket suitable for oxygen

Mounting brackets

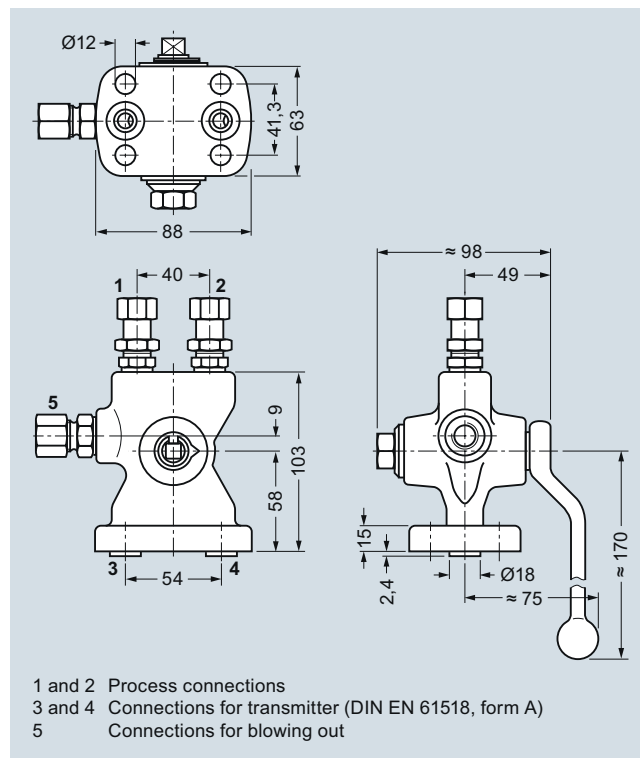
- M13: Required for wall mounting or for securing on rack (72 mm grid); made of electrogalvanized sheet-steel

Characteristic curves

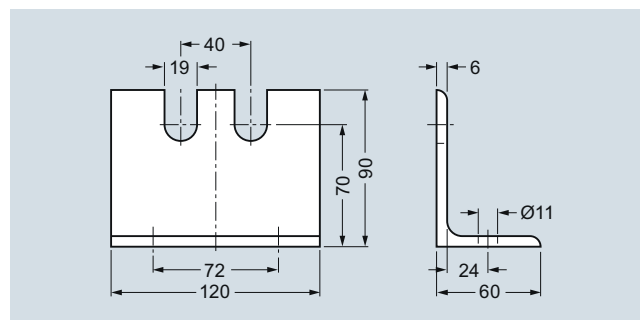


Multiway cock PN 100 (1450 psi), permissible operating pressure as a function of the permissible operating temperature

Dimensional drawings



Multiway cock 7MF9004-1P, for flanging to pressure transmitters for differential pressure, dimensions in mm



Mounting bracket 7MF9004-6AA (M13), dimensions in mm

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

3-way and 5-way valve manifolds DN 5

1

Overview



The three-spindle and five-spindle valve manifolds DN 5 (7MF9410-1../-3..) are used to shut off the differential pressure lines and to check the transmitter zero.

In addition, the five-way valve manifold permits blowing out of the differential pressure lines.

Benefits

- Available for aggressive and non-aggressive liquids and gases
- Max. working pressure 420 bar (6092 psi), with version for oxygen max. 100 bar (1450 psi)

Application

The 3-way and 5-way valve manifolds are available in versions for aggressive and non-aggressive liquids and gases.

Mounting plates are available for wall mounting, for securing to mounting racks or for pipe mounting.

Design

The process connection of the 3-way and 5-way valve manifolds is a pipe union with ferrule.

Both valve manifolds have 2 flange connections for connecting a pressure transmitter.

In addition, the five-way valve manifold has 2 blow-out connections.

Depending on the version the valve manifold has either 3 or 5 valves, each with an internal spindle thread.

Materials used

Component	Material	For non-aggressive liquids and gases		For aggressive liquids and gases	
		Mat. No.	Material	Mat. No.	Material
Housing	P250GH	1.0460	X 6 CrNiMoTi 17 12 2	1.4571/316Ti	
Head parts	C 35	1.0501			
Spindles	X 12 CrMoS 17	1.4104			
Cones	X 35 CrMo 17 hardened and tempered	1.4122			
Valve seats	X 6 CrNiMoTi 17 12 2	1.4571/316Ti			
Packings	PTFE	-	PTFE	-	

Function

- Shutting off the differential pressure lines
- Checking the pressure transmitter zero
- In addition, the five-way valve manifold permits blowing out of the differential pressure lines.

Selection and Ordering data

Article No.

3-way valve manifold DN 5

7MF9410 - A

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

For flanging to pressure transmitters for differential pressure, process connection: Pipe union with ferrule, max. working pressure 420 bar (6092 psi), weight 2.9 kg (order accessory set and mounting plate with Order code), without certificate

- for non-aggressive liquids and gases
- for aggressive liquids and gases

5-way valve manifold DN 5

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

For flanging to pressure transmitters for differential pressure, process connection: Pipe union with ferrule, max. working pressure 420 bar (6092 psi), weight 4.4 kg (order accessory set and mounting plate with Order code), without certificate

- for non-aggressive liquids and gases
- for aggressive liquids and gases

Accessories

Factory test certificate EN 10204-2.2

7MF9000-8AB

Material acceptance test certificate EN 10204-3.1

7MF9000-8AD

1 E

1 F

3 E

3 F

Selection and Ordering data	Order code	Article No.
Further designs¹⁾ Please add "-Z" to Article No. and specify Order code.		
Accessory set to EN (required for flanging, weight 0.2 kg) 4x screws $\frac{7}{16}$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2; chromized steel 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)	B31	7MF9010-5CC
4x screws $\frac{7}{16}$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2; chromized steel 2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)	B34	7MF9410-5CA
Accessory set to DIN²⁾ (required for flanging, weight 0.2 kg) 4x screws M10x55 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F) • Standard design • Version for oxygen	B11 B15 B16	7MF9010-6AD 7MF9010-6AE 7MF9010-6CC
4x screws M10x55 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)		
Mounting plate for valve manifold, made of electrogalvanized sheet-steel for wall mounting or for securing on rack (72 mm grid), weight 0.5 kg Scope of delivery: 1 mounting plate with bolts for mounting on valve manifold	M11	7MF9006-6EA
for pipe mounting , weight 0.7 kg Scope of delivery: 1x mounting plate M11, 2x pipe brackets with nuts and washers (for pipe with max. Ø 60.3 mm)	M12	7MF9006-6GA
Valve manifold 100 bar suitable for oxygen for 7MF9410-1F for 7MF9410-3F	S13 S14	
NACE MR-0175-certified incl. acceptance test certificate 3.1 to EN 10204 (only available for version 7MF9410-1FA and -3FA)	D07	

1) When ordering accessory set or mounting together with the valve manifolds, please use Order code; otherwise use Article No.

2) Flange connections to DIN 19213 only permissible up to PN 160 (2321 psi)

Accessories

Accessory set for 3-way and 5-way valve manifold DN 5 for flanging

- B31: 4 screws $\frac{7}{16}$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2.1, 2 flat gaskets
- B34: 4 screws $\frac{7}{16}$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2.1, 2 O-rings (FPM 90)
- B11: 4 screws M10x55 to DIN EN 24014, 4 washers, 2 flat gaskets
- B15 (suitable for oxygen): 4 screws M10x55 to DIN EN 24014, 4 washers, 2 flat gaskets
- B16: 4 screws M10x55 to DIN EN 24014, 4 washers, 2 O-rings (FPM 90)

Washers Ø 10.5 to DIN 125

Flat gaskets made of PTFE, max. 420 bar (6092 psi), 80 °C (176 °F)

O-ring to DIN 3771, 20 x 2.65 – S – FPM90, max. 420 bar (6092 psi), 120 °C (248 °F)

Note: M10 screws only permissible up to PN 160 (2320 psi)!

Mounting plate

Made of electrogalvanized sheet-steel

- M11: For wall mounting or for securing on rack (72 mm grid)
Scope of delivery:
- 1 mounting plate 7MF9006-6EA with bolts for mounting on valve manifold
- M12: For pipe mounting
Scope of delivery:
- 1 mounting plate M11
- 2 pipe brackets with nuts and washers for pipes with max. Ø 60.3 mm

Valve manifold 100 bar, suitable for oxygen

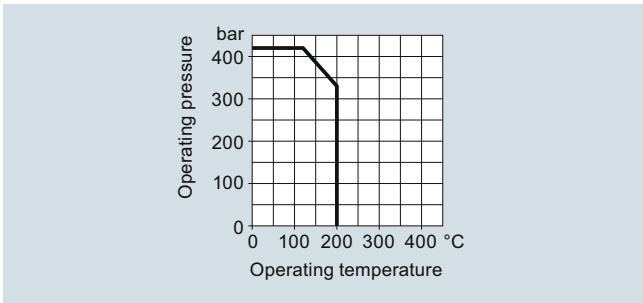
S12: Only in combination with versions for aggressive liquids and gases

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

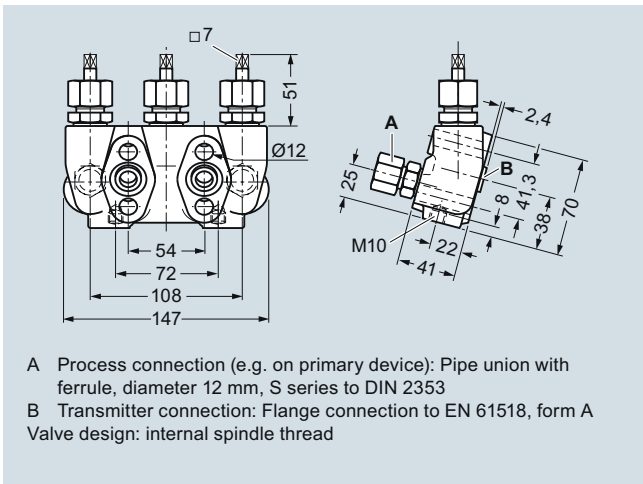
3-way and 5-way valve manifolds DN 5

Characteristic curves

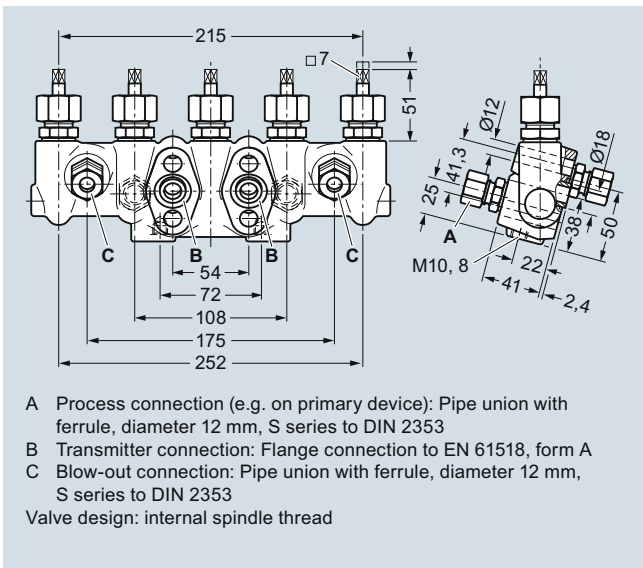


Permissible operating pressure as a function of the permissible operating temperature

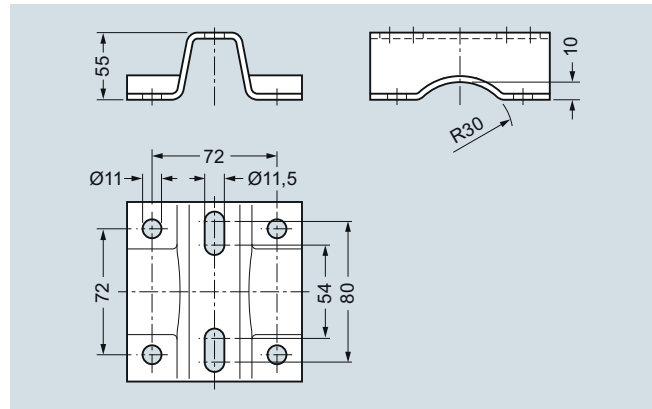
Dimensional drawings



3-way valve manifold DN 5 (7MF9410-1..), dimensions in mm

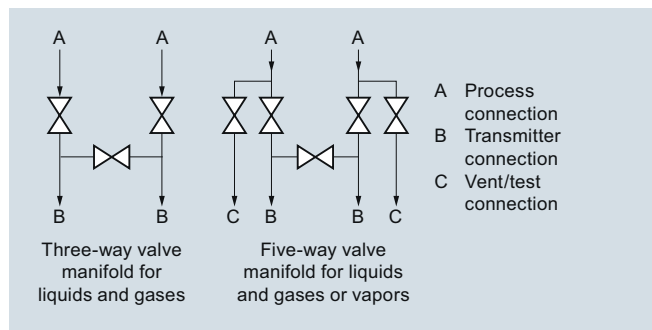


5-way valve manifold DN 5 (7MF9410-3..), dimensions in mm



Mounting plate 7MF9006-6.. (M11, M12) for valve manifold, dimensions in mm

Schematics



3-way and 5-way valve manifolds, connections

Overview

The 3-way valve manifold DN 8 (7MF9416-1../-2..) is for pressure transmitters for differential pressure. It is used to shut off and blow out differential pressure lines and to test the pressure transmitter zero.

In the designs with a test connection, a test device can be connected to test the pressure transmitter characteristic.

Benefits

- For aggressive and non-aggressive liquids and gases
- The maximum working pressure is 420 bar (6092 psi).

Application

The 3-way valve manifold is available in versions for aggressive and non-aggressive liquids and gases.

Mounting plates are available for wall mounting, for securing to mounting racks or for pipe mounting.

Design

For the process connection on the version for non-aggressive media it is possible to choose between a pipe union with ferrule and welding pins.

The version for aggressive media always has a pipe union with ferrule.

Both versions are available optionally with a test connection M20x1.5.

The valves have an internal spindle thread.

Materials used

Component	For non-aggressive liquids and gases		For aggressive liquids and gases	
	Material	Mat. No.	Material	Mat. No.
Housing	P250GH	1.0460	X 6 CrNiMoTi 17 12 2	1.4571/316Ti
Head parts	C 35	1.0501		
Spindles	X 12 CrMoS 17	1.4104		
Cones	X 35 CrMo 17 hardened and tempered	1.4122		
Valve seats	X 6 CrNiMoTi 17 12 2	1.4571/316Ti		
Packings	PTFE	-	PTFE	-

Function

The 3-way valve manifold DN 8 performs two functions as standard:

- Shutting off the differential pressure lines
- Checking the pressure transmitter zero

All versions are also available with a test connection, to which a test device for checking the pressure transmitter characteristic can be connected.

Selection and Ordering data

Article No.

3-way valve manifold DN 8

7MF9416 - ■ ■ A

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

For flanging to pressure transmitters for differential pressure, max. working pressure 420 bar (6092 psi), (order accessory set and mounting plate with Order code), without certificate

For non-aggressive liquids and gases process connection: Pipe union with ferrule Ø 12 mm

- without test connection
- with test connection

1 B

1 C

For non-aggressive liquids and gases process connection: Welding pin Ø 14 x 2.5

- without test connection
- with test connection

2 C

2 D

For aggressive liquids and gases process connection: Pipe union with ferrule Ø 12 mm

- without test connection
- with test connection

1 D

1 E

Accessories

Factory test certificate EN 10204-2.2

7MF9000-8AB

Material acceptance test certificate EN 10204-3.1

7MF9000-8AD

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

3-way valve manifold DN 8

Selection and Ordering data	Order code	Article No.
Further designs¹⁾ Please add "-Z" to Article No. and specify Order code.		
Accessory set to EN (required for flanging, weight 0.2 kg) 4x screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2; chromized steel 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)	B31	7MF9010-5CC
4x screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2; chromized steel 2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)	B34	7MF9410-5CA
Accessory set to DIN²⁾ (required for flanging, weight 0.2 kg) 4x screws M10x55 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)	B11	7MF9010-6AD
4x screws M10x55 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)	B16	7MF9010-6CC
Mounting plate For valve manifold, made of electrogalvanized sheet-steel for wall mounting or for securing on rack (72 mm grid), weight 0.5 kg Scope of delivery: 1 mounting plate with bolts for mounting on valve manifold	M11	7MF9006-6EA
for pipe mounting , weight 0.7 kg Scope of delivery: 1x mounting plate M11, 2x pipe brackets with nuts and washers (for pipe with max. Ø 60.3 mm)	M12	7MF9006-6GA
NACE MR-0175-certified incl. acceptance test certificate 3.1 to EN 10204 (only available for version 7MF9416-1DA and -1EA)	D07	

- 1) When ordering accessory set or mounting together with the valve manifold, please use Order code; otherwise use Article No.
2) Flange connections to DIN 19213 only permissible up to PN 160 (2321 psi)!

Accessories

Accessory set for 3-way valve manifold DN 8 for flanging

- B31: 4 screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2.1, 2 flat gaskets
- B34: 4 screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2.1, 2 O-rings (FPM 90)
- B11: 4 screws M10x55 to DIN EN 24014, 4 washers, 2 flat gaskets
- B16: 4 screws M10x55 to DIN EN 24014, 4 washers, 2 O-rings (FPM 90)

Washers Ø 10.5 to DIN 125

Flat gaskets made of PTFE, max. 420 bar (6092 psi), 80 °C (176 °F)

O-ring to DIN 3771, 20 x 2.65 - S - FPM90, max. 420 bar (6092 psi), 120 °C (248 °F)

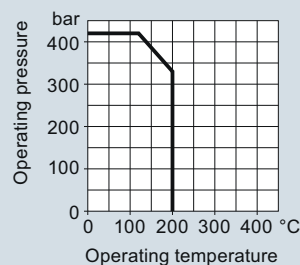
Note: M10 screws only permissible up to PN 160 (2320 psi)!

Mounting plate

Made of electrogalvanized sheet-steel

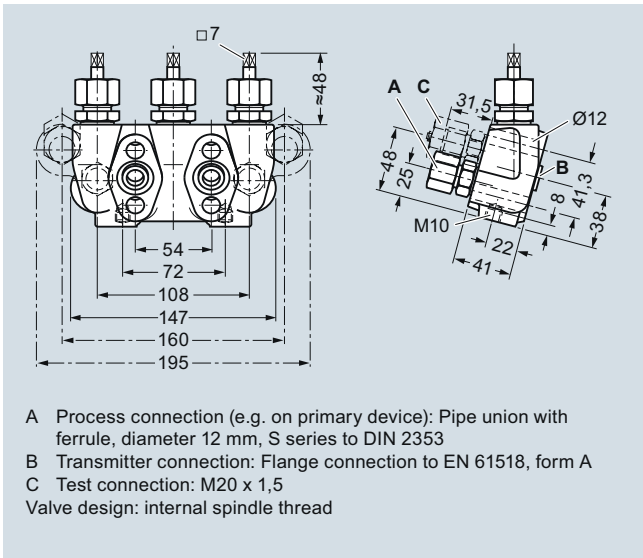
- M11: For wall mounting or for securing on rack (72 mm grid)
Scope of delivery:
- 1 mounting plate with bolts for mounting on valve manifold
- M12: For pipe mounting
Scope of delivery:
- 1 mounting plate M11
- 2 pipe brackets with nuts and washers for pipes with max. Ø 60.3 mm

Characteristic curves

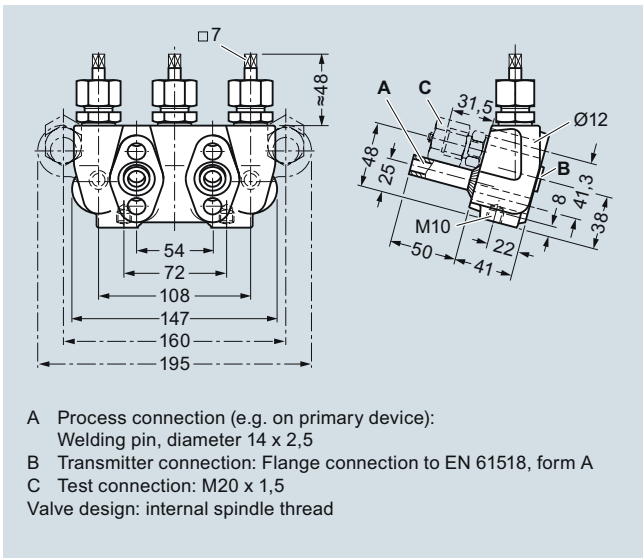


3-way valve manifold DN 8, permissible working pressure as a function of the permissible working temperature

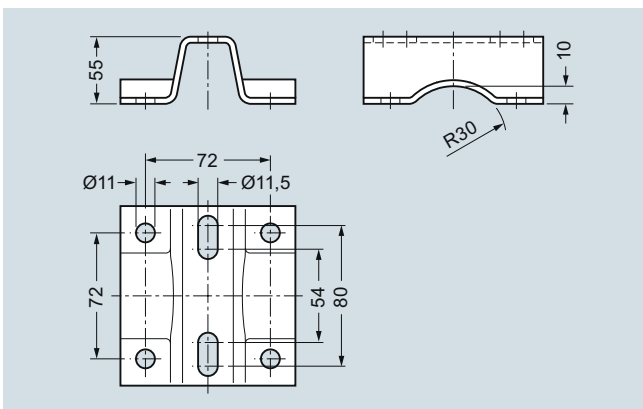
Dimensional drawings



3-way valve manifold DN 8 (7MF9416-1..) with pipe union, dimensions in mm

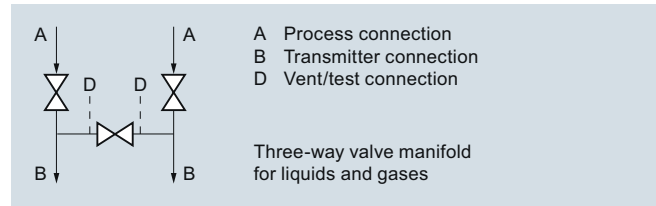


3-way valve manifold DN 8 (7MF9416-2..) with welding pin, dimensions in mm



Mounting plate 7MF9006-6.. (M11, M12) for valve manifold, dimensions in mm

Schematics



3-way valve manifold DN 8, connections

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

Valve manifold combination DN 5/DN 8

1

Overview



The valve manifold combination DN 5/DN 8 (7MF9416-6..) is for pressure transmitters for differential pressure.

The combination is used to shut off and blow out differential pressure lines and to test the pressure transmitter zero.

In the designs with a test connection, a test device can be connected to test the pressure transmitter characteristic.

Benefits

- Max. working pressure 420 bar (6092 psi)

Application

The valve manifold combination DN 5/DN 8 is designed for vapors.

Design

The valve manifold combination DN 5/DN 8 has a process connection with welding pins.

The connection for the pressure transmitter is designed as a flange connection, while the blow-out connection is designed as a pipe union with ferrule.

The manifold valves have an internal spindle thread, while the blow-out valves have an external spindle thread.

The optional test connections are M20x1.5.

Materials used

Component	Valve manifold DN 5		Blow-out valves DN 8	
	Material	Mat. No.	Material	Mat. No.
Housing	P250GH	1.0460	16 Mo 3	1.5415
Head parts	C 35	1.0501	21 CrMo V57	1.7709
Spindles	X 12 CrMoS 17	1.4104	X 20 Cr 13	1.4021
Cones	X 35 CrMo 17	1.4122	X 35 CrMo 17 hardened and tem- pered	1.4122
Valve seats	X 6 CrNiMoTi	1.4571/316Ti	X 20 Cr 13	1.4021
Packings	PTFE	-	Pure graphite	-
Welding pins	-	-	16 Mo 3	1.5415

Function

- Shutting off the differential pressure lines
- Blowing out the differential pressure lines
- Checking the pressure transmitter zero

As an option it is possible to order a version with a test connection, to which a test device for checking the transmitter characteristic can be connected.

Selection and Ordering data

Valve manifold combination DN 5/DN 8 for vapors

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

For flanging to pressure transmitters for differential pressure, max. working pressure 420 bar (6092 psi), also available in stainless steel on request (order accessory set with Order code), without certificate

- without test connection
- with test connection M20 × 1.5

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

Article No.

7MF9416-6-A

A

C

D

Selection and Ordering data

Order code

Article No.

Further designs¹⁾

Please add "-Z" to Article No. and specify Order code.

Accessory set to EN

(required for flanging, weight 0.2 kg)

4x screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2; chromized steel
2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)

B34

7MF9410-5CA

Accessory set to DIN²⁾

(required for flanging, weight 0.2 kg)

4x screws M10x55 to DIN EN 24014; chromized steel
4x washers Ø 10.5 mm to DIN 125; 2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F); Flange connection to DIN 19213 only permissible up to PN 160!

B16

7MF9010-6CC

¹⁾ When ordering accessory set together with the valve manifold combination, please use Order code; otherwise use Article No.

²⁾ Flange connections to DIN 19213 only permissible up to PN 160 (2321 psi)

Accessories

Accessory set for valve manifold combination DN 5/DN 8 for flanging

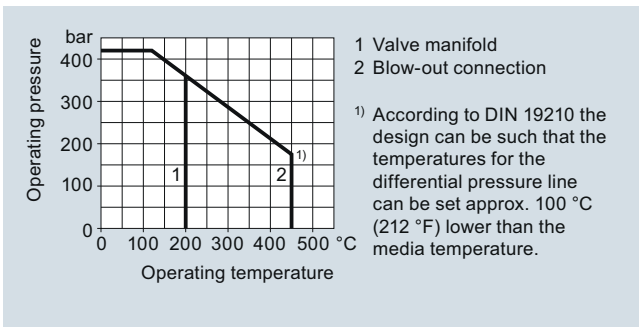
- B34: 4 screws $\frac{7}{16}$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2.1, 2 O-rings (FPM 90)
- B16: 4 screws M10x55 to DIN EN 24014, 4 washers, 2 O-rings (FPM 90)

Washers \varnothing 10.5 to DIN 125

O-ring to DIN 3771, 20 x 2.65 - S - FPM90, max. 420 bar (6092 psi), 120 °C (248 °F)

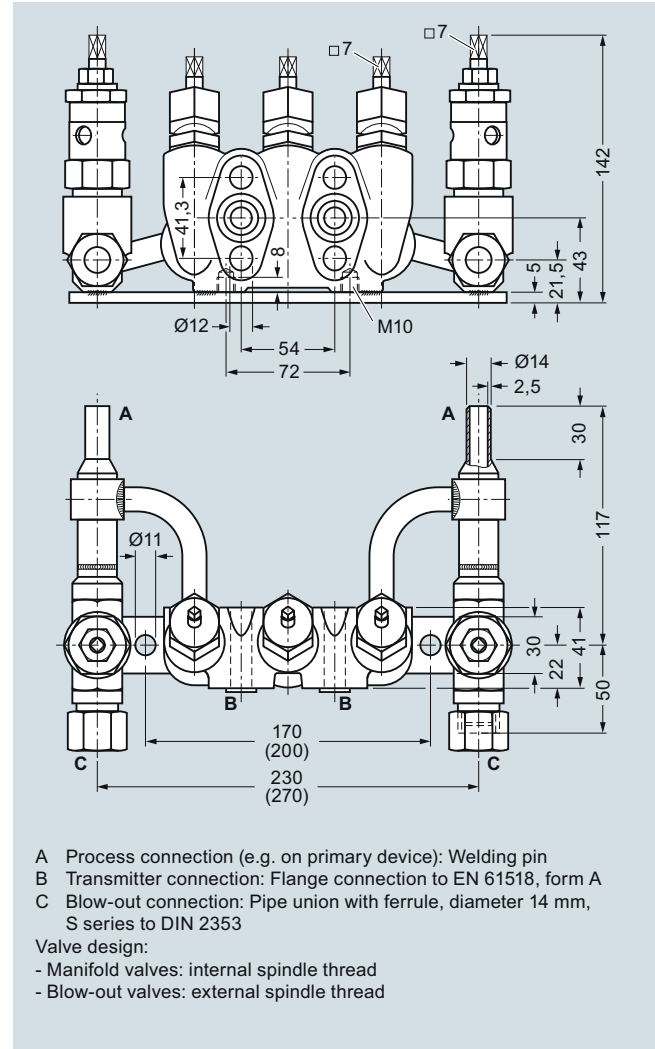
Note: M10 screws only permissible up to PN 160 (2321 psi)!

Characteristic curves



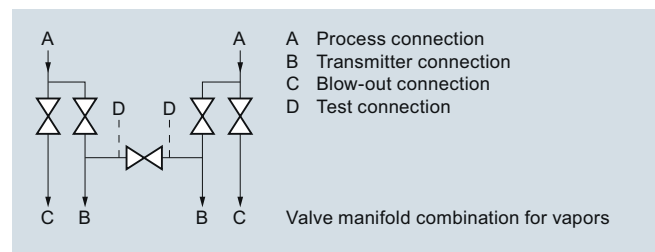
Permissible operating pressure as a function of the permissible operating temperature

Dimensional drawings



Valve manifold combination DN 5/DN 8 (7MF9416-6C.), dimensions in mm (deviating dimensions for 7MF9416-6D. shown in brackets)

Schematics



Valve manifold combination DN 5/DN 8, connections

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

Valve manifold combination DN 8

1

Overview



The valve manifold combination DN 8 (7MF9416-4..) is for pressure transmitters for differential pressure.

It is used to shut off and blow out the differential pressure lines and to check the pressure transmitter zero.

In the designs with a test connection, a test device can be connected to check the pressure transmitter characteristic.

Benefits

- Max. working pressure 420 bar (6092 psi)

Application

The valve manifold combination DN 8 is designed for vapors.

Design

The valve manifold combination DN 8 has a process connection with welding pins.

The connection for the pressure transmitter is designed as a flange connection, while the blow-out connection is designed as a pipe union with ferrule.

The manifold valves have an internal spindle thread, while the blow-out valves have an external spindle thread.

The optional test connection is M20x1.5.

The valve manifold combination DN 8 is supplied with a mounting plate.

Materials used

Component	Valve manifold		Blow-out valves	
	Material	Mat. No.	Material	Mat. No.
Housing	P250GH	1.0460	16 Mo 3	1.5415
Head parts	C 35	1.0501	21 CrMo V57	1.7709
Spindles	X 12 CrMoS 17	1.4104	X 20 Cr 13	1.4021
Cones	X 35 CrMo 17	1.4122	X 35 CrMo 17 hardened and tem- pered	1.4122
Valve seats	X 6 CrNiMoTi	1.4571/316Ti	X 20 Cr 13	1.4021
Packings	PTFE	-	Pure graphite	-
Welding pins	-	-	16 Mo 3	1.5415

Function

- Shutting off the differential pressure lines
- Blowing out the differential pressure lines
- Checking the pressure transmitter zero

As an option it is possible to order a version with a test connection, to which a test device for checking the pressure transmitter characteristic can be connected.

Selection and Ordering data

Valve manifold combination DN 8 for vapors

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

for flanging to pressure transmitters for differential pressure, with mounting plate, max. working pressure 420 bar (6092 psi), also available in stainless steel on request (order accessory set with Order code), without certificate

- without test connection
- with test connection M20 × 1.5

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

Article No.

7MF9416 - A

4 C

4 D

Selection and Ordering data

Order code

Article No.

Further designs¹⁾

Please add "-Z" to Article No. and specify Order code.

Accessory set to EN

(required for flanging, weight 0.2 kg)

4x screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B18.2; chromized steel
2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)

B34

7MF9410-5CA

Accessory set to DIN²⁾

(required for flanging, weight 0.2 kg)

4x screws M10x55 to DIN EN 24014; chromized steel
4x washers Ø 10.5 mm to DIN 125;
2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)
Flange connection to DIN 19 213 only permissible up to PN 160!

B16

7MF9010-6CC

- ¹⁾ When ordering accessory set together with the valve manifold combination, please use Order code; otherwise use Article No.
- ²⁾ Flange connections to DIN 19213 only permissible up to PN 160 (2321 psi)

Accessories

Accessory set for valve manifold combination DN 8 for flanging

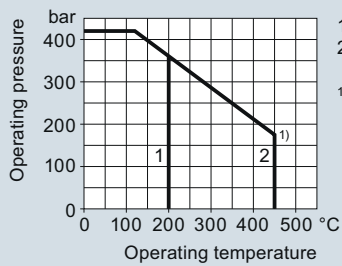
- B34: 4 screws $7/16$ -20 UNF x $2\frac{1}{8}$ inch to ASME B 18.2.1, 2 O-rings (FPM 90)
- B16: 4 screws M10x55 to DIN EN 24014, 4 washers, 2 O-rings (FPM 90)

Washers Ø 10.5 to DIN 125

O-ring to DIN 3771, 20 x 2.65 – S – FPM90, max. 420 bar (6092 psi), 120 °C (248 °F)

Note: M10 screws only permissible up to PN 160 (2321 psi)!

Characteristic curves

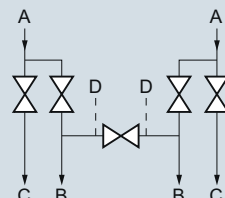


- 1 Valve manifold
2 Blow-out connection

¹⁾ According to DIN 19210 the design can be such that the temperatures for the differential pressure line can be set approx. 100 °C (212 °F) lower than the media temperature.

Permissible operating pressure as a function of the permissible operating temperature

Schematics

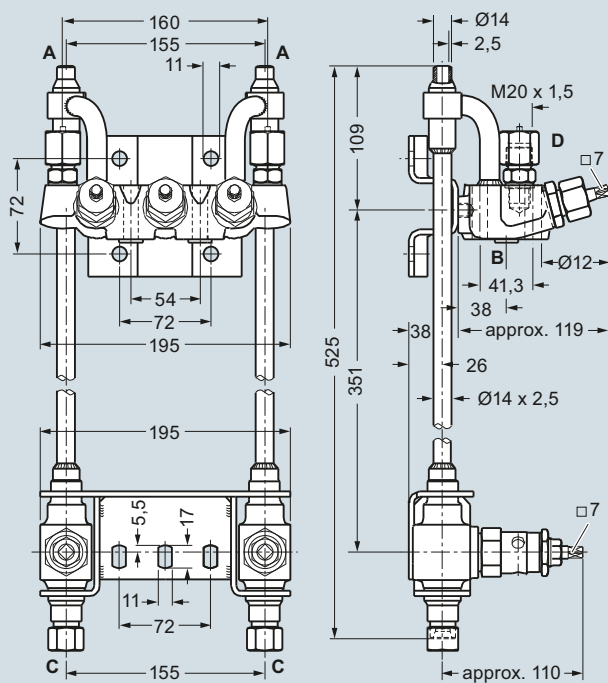


- A Process connection
B Transmitter connection
C Blow-out connection
D Test connection

Valve manifold combination for vapors

Valve manifold combination DN 8, connections

Dimensional drawings



- A Process connection (e.g. on primary device): Welding pin
B Transmitter connection: Flange connection to EN 61518, form A
C Blow-out connection: Pipe union with ferrule, diameter 14 mm, S series to DIN 2353
D Test connection (only with Article No. 7MF9416-4D.): M20 x 1,5

Valve design:

- Manifold valves: internal spindle thread
- Blow-out valves: external spindle thread

Valve manifold combination DN 8 (7MF9416-4..), dimensions in mm

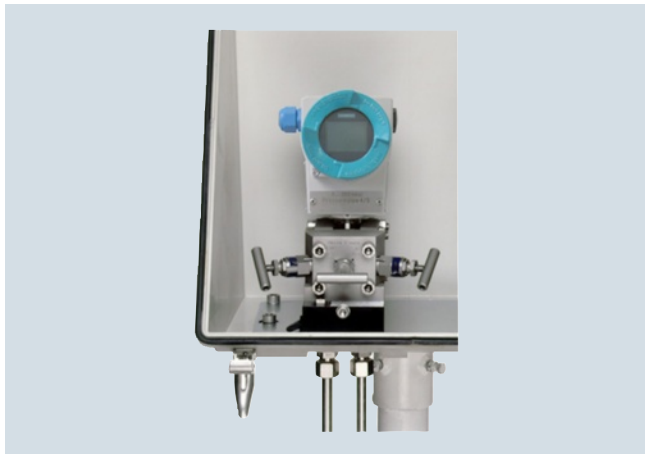
Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

2-, 3- and 5-spindle valve manifolds for installing in protective boxes

1

Overview



The 2-spindle, 3-spindle and 5-spindle valve manifolds (7MF9412-1..) are used to shut off the differential pressure lines and to check the transmitter zero.

The five-spindle valve manifold permits venting on the transmitter side and checking of the transmitter characteristic.

These valve manifolds are preferentially used when mounting in protective boxes. In addition, they can also be used for wall, frame or pipe mounting together with the mounting bracket.

Transmitters of the DS series can be operated and read from the front when using these valve manifolds.

Application

The valve manifolds DN 5 are designed for liquids and vapors and for installing in protective boxes.

Each is available in a version for oxygen on request

Design

All versions of the spindle manifolds have a process connection 1/2-14 NPT.

The connection for the pressure transmitter is always designed as a flange connection to IEC 61518, Form A.

The 2-spindle and the 5-spindle valve manifold have in addition a vent and test connection 1/4-18 NPT.

The valves have an external spindle thread.

Materials used

Components	Material	Mat. No.
Housing	X 2 CrNiMo 17 13 2	1.4404/316L
Cones	X 6 CrNiMoTi 17 12 2	1.4571/316Ti
Spindles	X 2 CrNiMo 18 10	1.4404/316L
Head parts	X 5 CrNiMo 18 10	1.4401/316
Packings	PTFE	-

Functions

Functions of all valve manifolds:

- Shutting off the differential pressure lines
- Checking the pressure transmitter zero

Additional functions of the 2-spindle and 5-spindle valve manifolds through the vent and test connection:

- Venting on the transmitter side
- Checking the pressure transmitter characteristic

Selection and Ordering data

Valve manifolds DN 5 for mounting in protective boxes

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

for liquids and gases
for flanging to pressure transmitters for absolute and differential pressure
Material: stainless steel, mat. No: 1.4404/316L
max. working pressure 420 bar (6092 psi)
(order accessory set with Order code),
without certificate

- 2-spindle valve manifold with rotating sleeve G $\frac{1}{2}$
- 2-spindle valve manifold with flange connection
- 3-spindle valve manifold
- 5-spindle valve manifold

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

Article No.

7MF9412 - A

1 B

1 C

1 D

1 E

7MF9000-8AB

7MF9000-8AD

Selection and Ordering data

Order code

Article No.

Further designs¹⁾

Please add "-Z" to Article No. and specify Order code.

Accessory set to EN

(connection between valve manifold and pressure transmitter)

for valve manifold 7MF9412-1C.

2x screws 7/16-20 UNF x 2 inch to ASME B18.2.1; chromized steel
1x O-ring to DIN 3771,
20 x 2.65 - S - FPM90,
max. permissible 420 bar (6092 psi),
120 °C (248 °F)

F32

7MF9412-6CA

2x screws 7/16-20 UNF x 2 inch to ASME B18.2.1; chromized steel

F35

7MF9412-6DA

1x gasket made of PTFE,
max. permissible 420 bar (6092 psi),
80 °C (176 °F)²⁾

for valve manifold 7MF9412-1D and -1E.

4x screws 7/16-20 UNF x 2 inch to ASME B18.2.1; chromized steel
2x O-rings to DIN 3771,
20 x 2.65 - S - FPM90,
max. permissible 420 bar (6092 psi),
120 °C (248 °F)²⁾

F34

7MF9412-6GA

4x screws 7/16-20 UNF x 2 inch to ASME B18.2.1; chromized steel
2x flat gaskets made of PTFE,
max. permissible 420 bar (6092 psi),
80 °C (176 °F)²⁾

F36

7MF9412-6HA

Selection and Ordering data	Order code	Article No.
Further designs¹⁾		
Please add "-Z" to Article No. and specify Order code.		
Accessory set to DIN (connection between valve manifold and pressure transmitter) For valve manifold 7MF9412-1C.		
2x screws M10x50 to DIN EN 24014; chromized steel 2x washers Ø 10.5 mm to DIN 125; 1x O-ring to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F) ²⁾	F12	7MF9412-6AA
2x screws M10x50 to DIN EN 24014; chromized steel 2x washers Ø 10.5 mm to DIN 125; 1x gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F) ²⁾	F15	7MF9412-6BA
For valve manifold 7MF9412-1D and -1E.		
4x screws M10x50 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x O-rings to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F) ²⁾	F14	7MF9412-6EA
4x screws M10x50 to DIN EN 24014; chromized steel 4x washers Ø 10.5 mm to DIN 125; 2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F) ²⁾	F16	7MF9412-6FA
Mounting bracket required for wall mounting or for securing to mounting rack, with bolts for mounting on valve manifold		
• for valve manifolds 7MF9412-1B. and -1C.	M14	7MF9006-6LA
• for valve manifold 7MF9412-1D.	M17	7MF9006-6NA
• for valve manifold 7MF9412-1E.	M18	7MF9006-6PA
Mounting clip		
2 off, to secure mounting bracket to pipe	M16	7MF9006-6KA
Valve manifold 100 bar		
Oil- and grease-free cleaning for oxygen applications, max. pressure PN 100 (1450 psi) and max. temperature 60 °C (140 °F)		
• for valve manifolds 7MF9412-1B. and -1C.	S12	
• for valve manifold 7MF9412-1D.	S13	
• for valve manifold 7MF9412-1E.	S14	
NACE MR-0175-certified		
incl. acceptance test certificate 3.1 to EN 10204	D07	

- 1) When ordering accessory set or mounting together with the valve manifolds, please use Order code; otherwise use Article No.
2) Flange connections with M10 screws only permissible up to PN 160 (2321 psi)!

Accessories

Accessory set for 2-, 3- and 5-spindle valve manifolds (Connection between manifold and transmitter)

2-spindle valve manifold DN 5 with flange connection

- F32: 2 screws 7/16 20 UNF x 2 inch to ASME B 18.2.1, 1 O Ring (FPM90)
- F35: 2 screws 7/16 20 UNF x 2 inch to ASME B 18.2.1, 1 flat-gasket
- F12: 2 screws M10x50 to DIN EN 24014, 2 washers, 1 O-ring (FPM90)
- F15: 2 screws M10x50 to DIN EN 24014, 2 washers, 1 flat gasket

3-spindle and 5-way valve manifold DN 5

- F34: 4 screws 7/16 20 UNF x 2 inch to ASME B 18.2.1, 2 O-rings (FPM90)
- F36: 4 screws 7/16 20 UNF x 2 inch to ASME B 18.2.1, 2 flat-gaskets
- F14: 4 screws M10x50 to DIN EN 24014, 4 washers, 2 O-rings (FPM90)
- F16: 4 screws M10x50 to DIN EN 24014, 4 washers, 2 flat-gaskets

Washers Ø 10.5 to DIN 125

Flat-gaskets made of PTFE, max. 420 bar (6092 psi), 80 °C (176 °F)

O-ring to DIN 3771, 20 x 2.65 - S - FPM90; max. 420 bar (6092 psi), 120 °C (248 °F)

Note:

Flange connections with M10 screws only permissible up to PN 160 (2321 psi)!

Mounting bracket for wall mounting or for securing to mounting rack

With bolts for mounting on valve manifold

- M14: For 2-spindle valve manifold DN 5
- M17: For 3-spindle valve manifold DN 5
- M18: For 5-spindle valve manifold DN 5

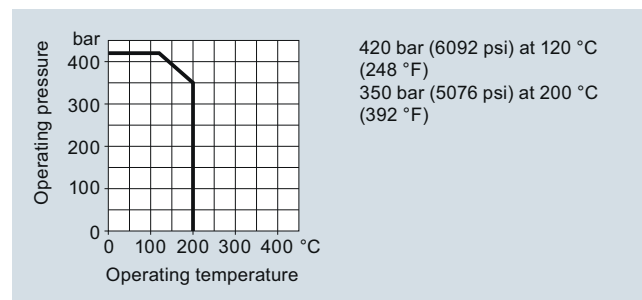
Mounting clips (2 off)

- M16: For securing the mounting brackets M14, M17 and M18 to pipe

Valve manifold 100 bar, suitable for oxygen

- S12: For 2-spindle valve manifold DN 5
- S13: For 3-spindle valve manifold DN 5
- S14: For 5-spindle valve manifold DN 5

Characteristic curves



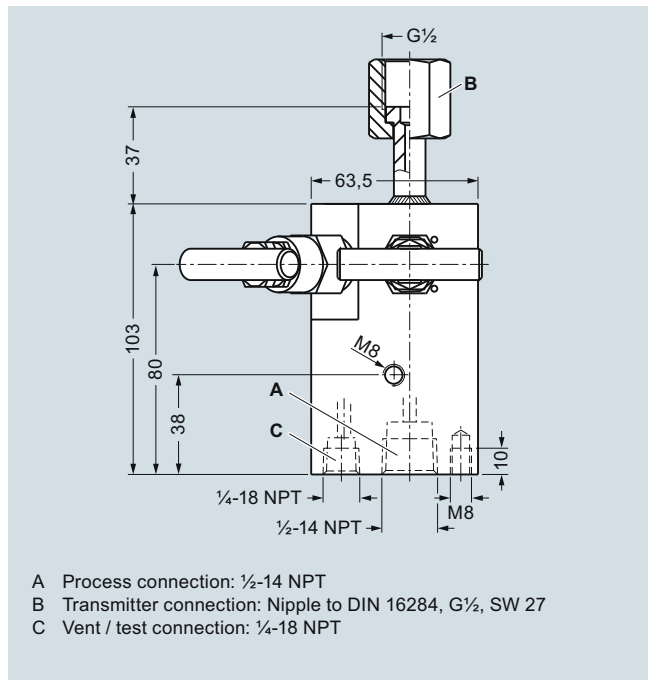
Permissible operating pressure as a function of the permissible operating temperature

Pressure Measurement

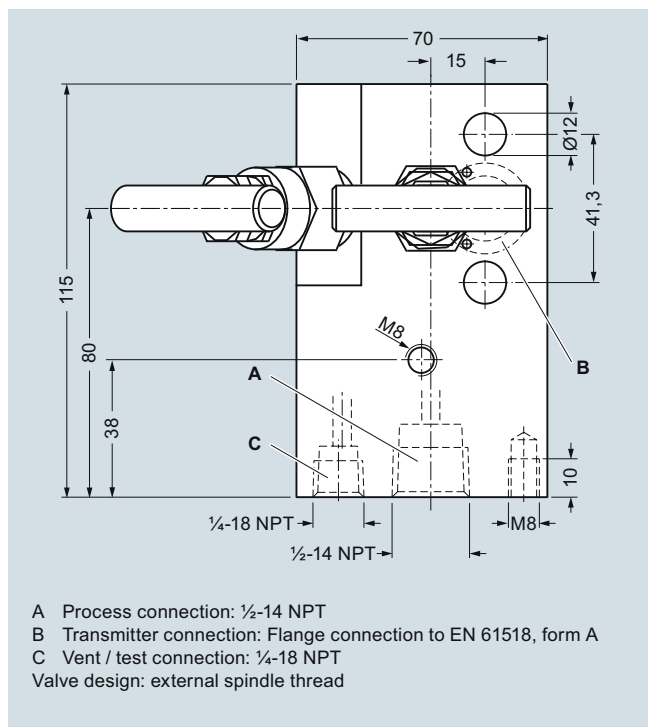
Fittings - Shut-off valves for differential pressure transmitters

2-, 3- and 5-spindle valve manifolds for installing in protective boxes

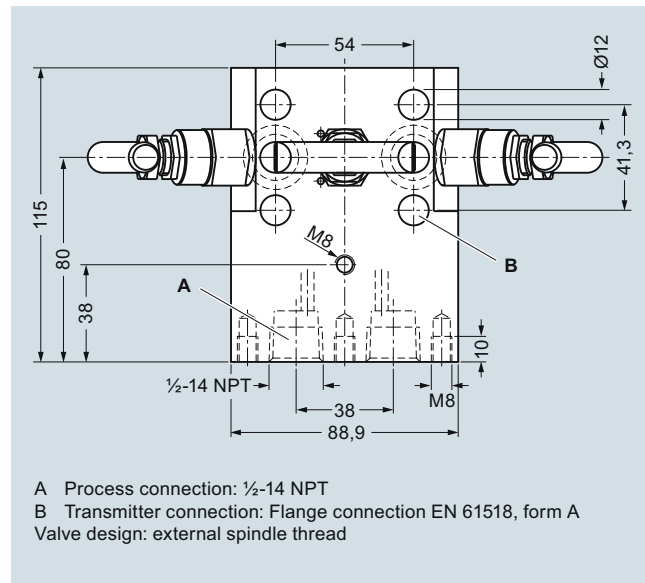
Dimensional drawings



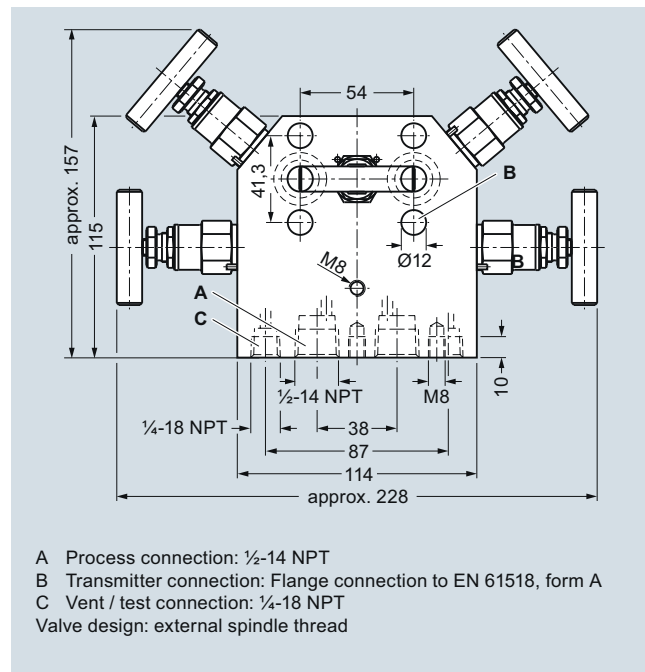
2-spindle valve manifold DN 5 (7MF9412-1B..) with rotating sleeve, dimensions in mm



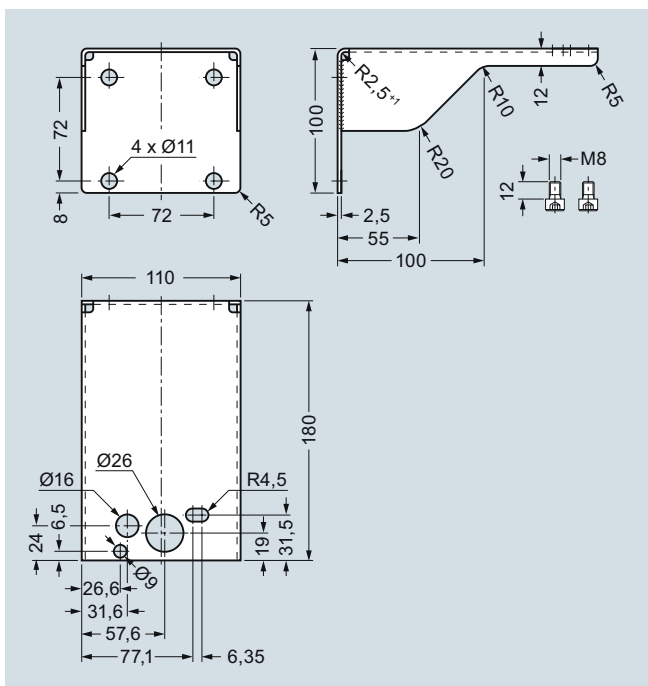
2-spindle valve manifold DN 5 (7MF9412-1C..), dimensions in mm



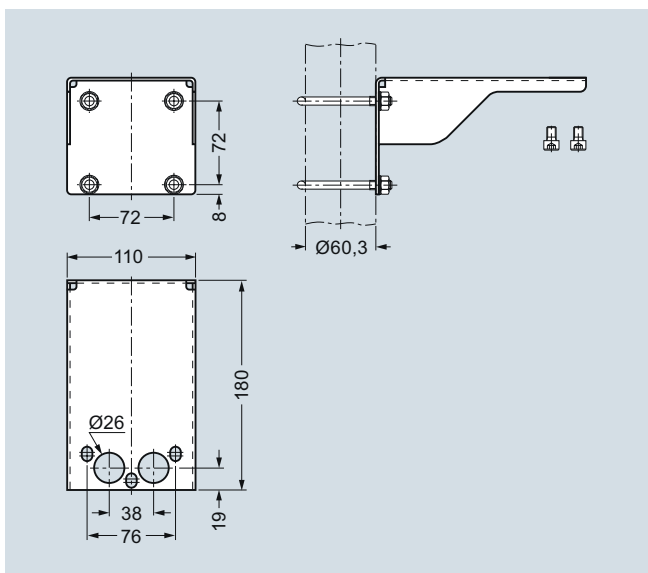
3-spindle valve manifold DN 5 (7MF9412-1D..), dimensions in mm



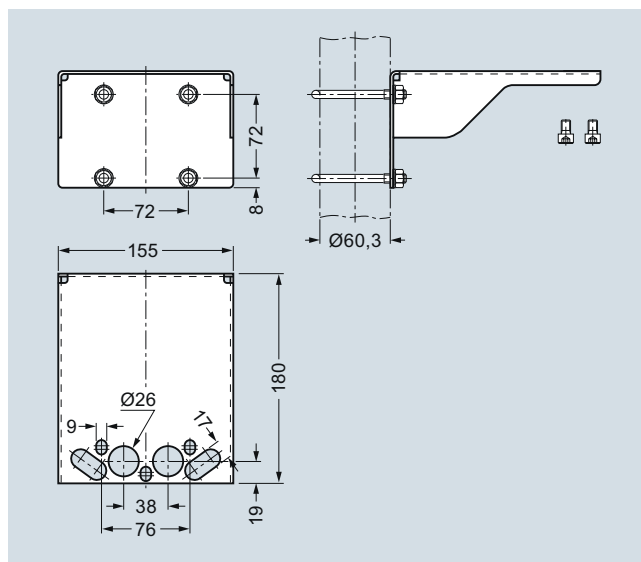
5-spindle valve manifold DN 5 (7MF9412-1E..), dimensions in mm



Mounting bracket (7MF9006-6LA)/(M14) for 2-spindle valve manifolds, dimensions in mm

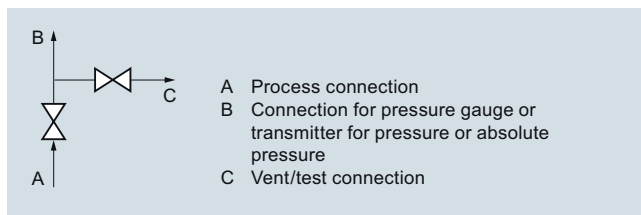


Mounting bracket (7MF9006-6NA)/(M17) for 3-spindle valve manifolds, dimensions in mm

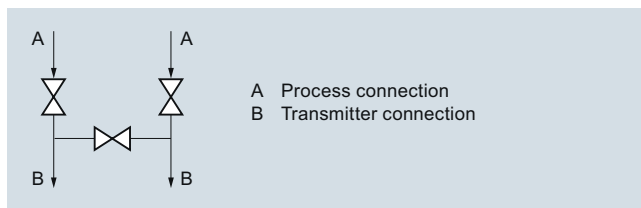


Mounting bracket (7MF9006-6PA)/(M18) for 5-spindle valve manifolds, dimensions in mm

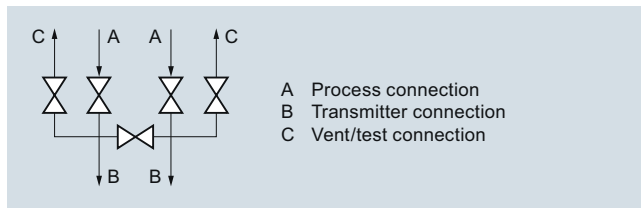
Schematics



2-spindle valve manifold DN 5 (with rotating sleeve G $\frac{1}{2}$ or flange connection), connections



3-spindle valve manifold DN 5, connections



5-spindle valve manifold DN 5, connections

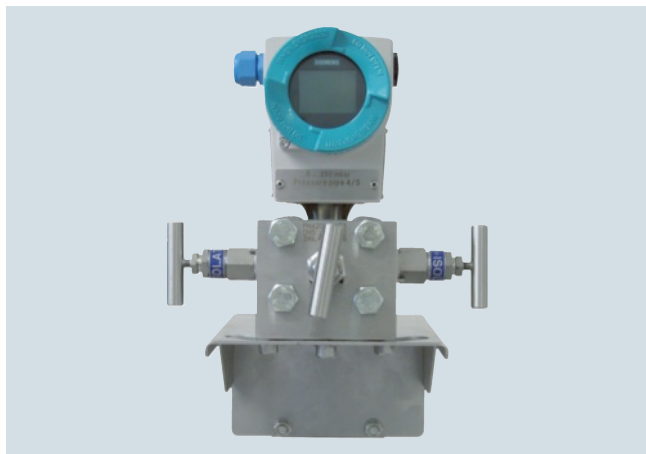
Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

3- and 5-spindle valve manifolds for vertical angular differential pressure lines

1

Overview



These 3-spindle and 5-spindle valve manifolds 7MF9413-1.. were developed specially for vertical differential pressure lines.

The valve manifolds are used to shut off the differential pressure lines and to check the pressure transmitter zero.

The 5-spindle valve manifold permits venting on the transmitter side and checking of the pressure transmitter characteristic.

Benefits

- For vertical differential pressure lines
- Max. operating pressure 420 bar (6092 psi)
- Transmitters of the DS series can be operated and read from the front.

Application

The 3-spindle and 5-spindle valve manifolds for vertical differential pressure lines are for liquids and gases. The valve manifolds are flanged on the pressure transmitter.

Design

All versions of the spindle valve manifolds have a process connection 1/2-14 NPT.

The connection for the pressure transmitter is always designed as a flange connection to IEC 61518, form B.

The 2-spindle and the 5-spindle valve manifold have in addition a vent and test connection 1/4-18 NPT.

Materials used:

Component	Material	Mat. No.
Housing	X 2 CrNiMo 17 13 2	1.4404/316L
Cones	X 6 CrNiMoTi 17 12 2	1.4571/316Ti
Spindles	X 2 CrNiMo 18 10	1.4404/316L
Head parts	X 5 CrNiMo 18 10	1.4401/316
Packings	PTFE	-

Function

Functions of all valve manifolds:

- Shutting off the differential pressure lines
- Checking the pressure transmitter zero

Additional functions of the 2-spindle and 5-spindle valve manifolds through the vent and test connection:

- Venting on the transmitter side
- Checking the pressure transmitter characteristic

Selection and Ordering data

Valve manifolds for vertical differential pressure lines

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

for liquids and gases
for flanging to pressure transmitters for absolute and differential pressure
Material: stainless steel, mat. No: 1.4404/316L
max. working pressure 420 bar (6092 psi)
(order accessory set with Order code),
without certificate

- 3-spindle valve manifold
- 5-spindle valve manifold

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

Article No.

7MF9413-1

A

1D

1E

7MF9000-8AB

7MF9000-8AD

Selection and Ordering data

Further designs¹⁾

Please add "-Z" to Article No. and specify Order code.

Accessory set to EN

(connection between valve manifold and pressure transmitter)

4x screws 7/16-20 UNF x 1 3/4 inch to ASME B18.2.1; chromized steel
2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

K36

7MF9411-5DB

Accessory set to DIN²⁾

(connection between valve manifold and pressure transmitter)

4x screws M10x45 to DIN EN 24014; chromized steel
4x washers Ø 10.5 mm to DIN 125;
2x flat gaskets made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F); Flange connection with M10 screws only permissible up to PN 160 (2321 psi).

K16

7MF9411-6BB

Mounting bracket

required **for wall mounting** or for securing to mounting rack, with bolts for mounting on valve manifold

- for valve manifold 7MF9413-1D.
- for valve manifold 7MF9413-1E.

M17

7MF9006-6NA

M18

7MF9006-6PA

required **for mounting on 2" stand-pipe**, with bolts for mounting on valve manifold

- for valve manifold 7MF9413-1D.

M19

7MF9006-6QA

Mounting clip

2 off, to secure mounting bracket to pipe

M16

7MF9006-6KA

Valve manifold 100 bar (1450 psi)

suitable for oxygen

- for valve manifold 7MF9413-1D.
- for valve manifold 7MF9413-1E.

S13

S14

NACE MR-0175-certified

incl. acceptance test certificate 3.1 to EN 10204

D07

¹⁾ When ordering accessory set or mounting together with the multiway cock, please use Order code; otherwise use Article No.

²⁾ Flange connections to DIN 19213 only permissible up to PN 160 (2321 psi)!

Accessories**Accessory set (connection between manifold and transmitter)**

- K36: 4 screws $\frac{7}{16}$ -20 UNF x $1\frac{3}{4}$ inch to ASME B18.2.1, 2 flat gaskets
- K16: 4 screws M10x45 to DIN EN 24014, 4 washers, 2 flat gaskets

Washers \varnothing 10.5 to DIN 125

Flat gaskets made of PTFE, max. 420 bar (6092 psi), 80 °C (176 °F)

Note: Flange connection with M10 screws only permissible up to PN 160 (2321 psi)!

Mounting bracket for wall mounting or for securing to mounting rack

With bolts for mounting on valve manifold

- M17: For 3-spindle valve manifold
- M18: For 5-spindle valve manifold

Mounting bracket for mounting on 2" standpipe

With bolts for mounting on valve manifold

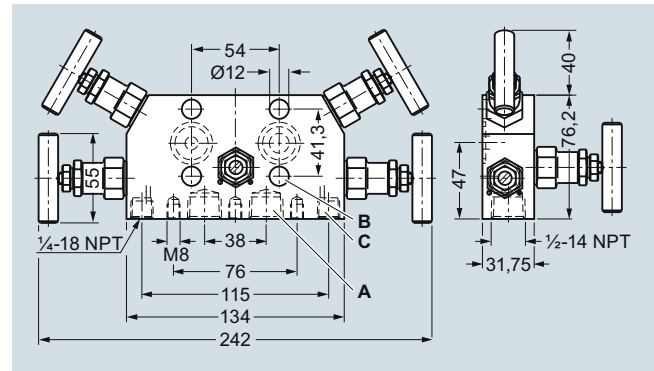
- M19: For 3-spindle valve manifold

Mounting clips (2 off)

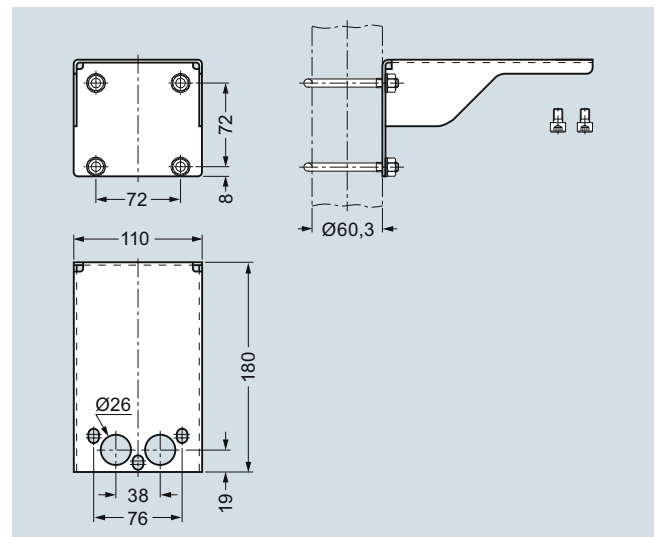
For securing the mounting brackets M17, M18 and M19 to pipe

Valve manifold 100 bar, suitable for oxygen

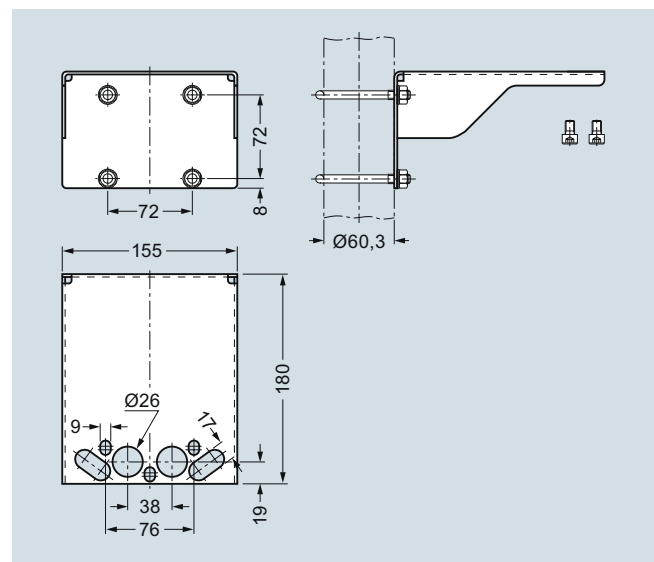
- For 3-spindle valve manifold
- For 5-spindle valve manifold



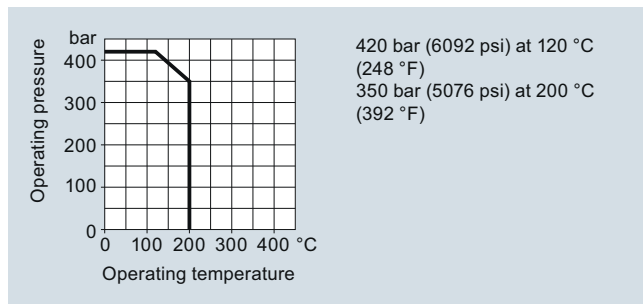
5-spindle valve manifold 7MF9413-1E. for vertical differential pressure lines, dimensions in mm



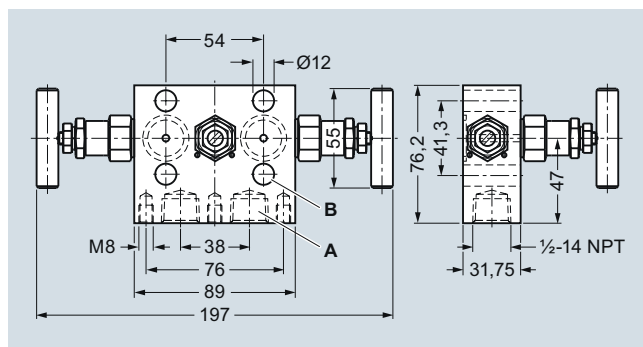
Mounting bracket (7MF9006-6NA)/(M17) for 3-spindle valve manifolds, dimensions in mm



Mounting bracket (7MF9006-6PA)/(M18) for 5-spindle valve manifolds, dimensions in mm

Characteristic curves

Permissible operating pressure as a function of the permissible operating temperature

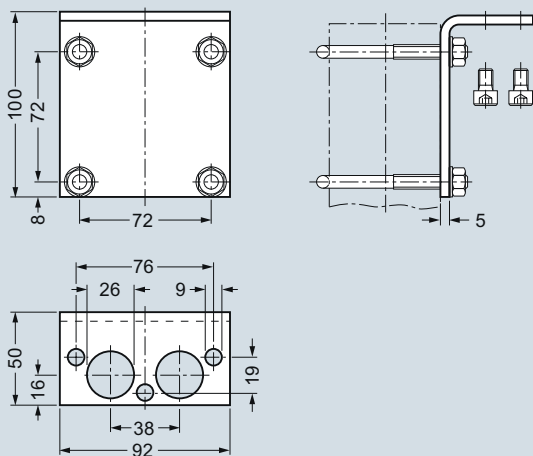
Dimensional drawings

3-spindle valve manifold 7MF9413-1D. for vertical differential pressure lines, dimensions in mm

Pressure Measurement

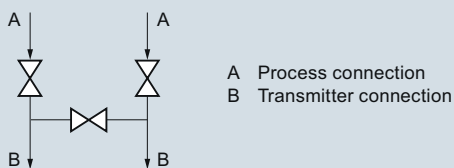
Fittings - Shut-off valves for differential pressure transmitters

3- and 5-spindle valve manifolds for vertical angular differential pressure lines

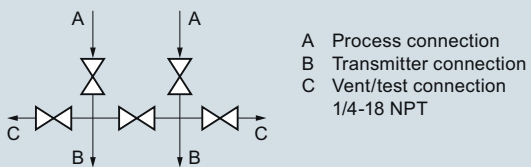


Mounting bracket (7MF9006-6QA)/(M19) for 3-spindle valve manifolds, dimensions in mm

Schematics



3-spindle valve manifold for vertical differential pressure lines, connections



5-spindle valve manifold for vertical differential pressure lines, connections

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

Low-pressure multiway cock

1

Overview



The low-pressure multiway cock 7MF9004-4CA/-4DA can be flanged to pressure transmitters for differential pressure.

Benefits

- Robust design
- For liquids and gases
- One-hand operation

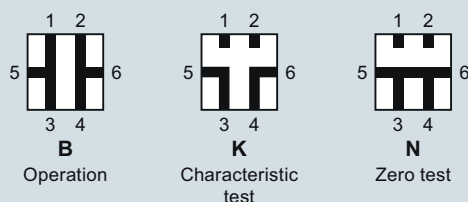
Design

The multiway cock has 2 process connections and 2 test connections, which are available in 2 versions (with sealing screws $G^{3/8}$ or quick-release couplings). The housing is made of hot-pressed brass CuZn39Pb3, CW 614N. Test connections with sealing screws or with self-sealing quick-release couplings.

Note: An accessory set is always required for flanging of the multiway cock to a differential pressure transmitter.

Function

- Shutting off the differential pressure lines
- Testing the pressure transmitter zero
- Testing the pressure transmitter characteristic



Cock positions; the symbols are printed on the cock

Selection and Ordering data

Article No.

Low-pressure multiway cock

for liquids and gases, for flanging to pressure transmitters, max. working pressure 25 bar (363 psi), max. working temperature 60 °C (140 °F) (up to 80 °C (176 °F) for a short time), weight 1.75 kg (without accessory set)

Test connections

2x sealing screws $G^{3/8}$
2x quick-release couplings

7MF9004-4CA

7MF9004-4DA

Accessories

Test report to EN 10204-3.1

7MF9000-8AB

Material acceptance test certificate to EN 10204-3.1

7MF9000-8AD

Selection and Ordering data

Order code

Article No.

Further designs¹⁾

Please add "-Z" to Article No. and specify Order code.

Accessory set to EN

(required for flanging, weight 0.2 kg)

4x screws $7/16$ -20 UNF x 1 inch to ASME B18.2.1; chromized steel
2x gaskets made of PTFE, max. permissible temperature 80 °C (176 °F)

L31

7MF9004-5CC

Accessory set to DIN

(required for flanging, weight 0.2 kg)

4x screws M10x25 to DIN EN 24017; chromized steel
4x washers \varnothing 10.5 mm to DIN 125;
2x gaskets made of PTFE, max. permissible temperature 80 °C (176 °F)

- Standard design

L11

7MF9004-6AD

- Version for oxygen

L15

7MF9004-6AE

Multiway cock in oil-free and grease-free design

BAM-tested lubricant, gasket suitable for oxygen

S11

Mounting bracket

required for wall mounting or for securing on rack (72 mm grid), made of electrogalvanized sheet-steel, weight 0.85 kg

M13

7MF9004-6AA

¹⁾ When ordering accessory set or mounting together with the multiway cock, please use Order code; otherwise use Article No.

Pressure Measurement

Fittings - Shut-off valves for differential pressure transmitters

Low-pressure multiway cock

Accessories

Accessory set for low-pressure multiway cock

- L31: 4 screws $7/16$ -20 UNF x 1 inch, 2 flat gaskets
- L11: 4 screws M10x25 to DIN EN 24017, 4 washers, 2 flat gaskets
- L15 (suitable for oxygen): 4 screws M10x25 to DIN EN 24017, 4 washers, 2 flat gaskets

Washers \varnothing 10.5 to DIN 125

Flat gaskets made of PTFE, max. permissible temperature 80 °C (176 °F)

Multiway cock in oil-free and grease-free design

- S11: BAM-tested lubricant, gasket suitable for oxygen

Mounting brackets

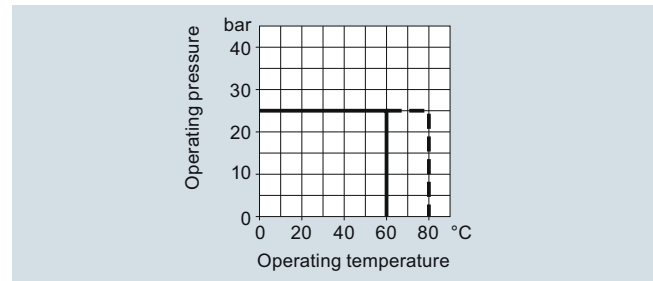
- M13: Required for wall mounting or for securing on rack (72 mm grid); made of electrogalvanized sheet-steel

Options

Test connections

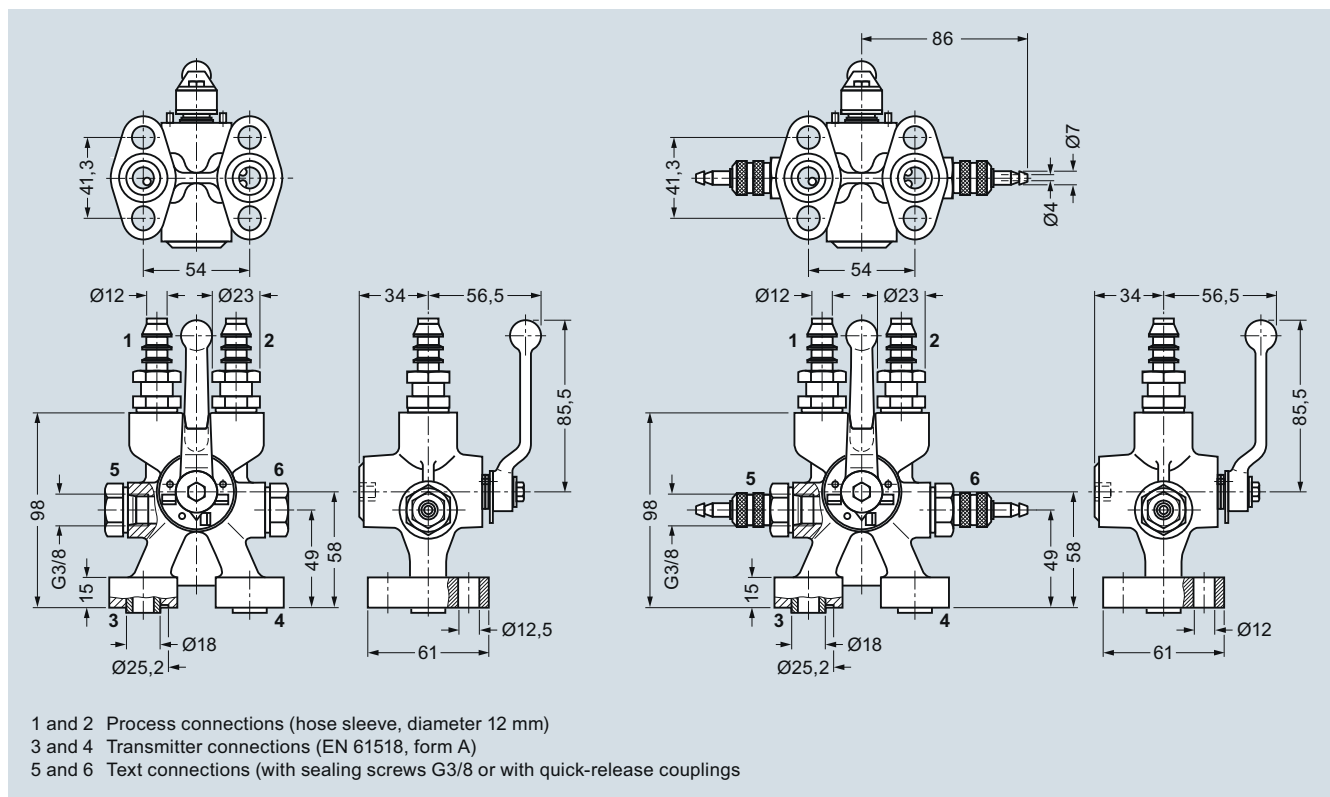
- 2 sealing screws $G^{3/8}$
- 2 quick-release couplings

Characteristic curves

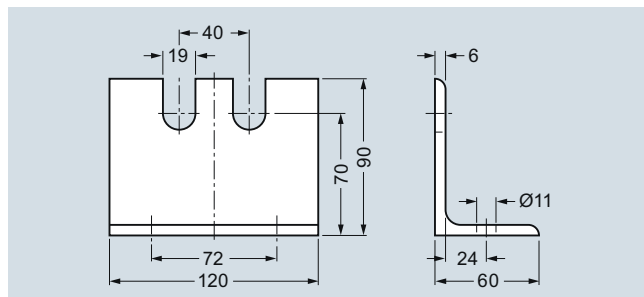


Low-pressure multiway cock, permissible operating pressure as a function of the permissible operating temperature

Dimensional drawings



Low-pressure multiway cock 7MF9004-4CA/-4DA for direct flanging to pressure transmitters for differential pressure, dimensions in mm



Mounting bracket 7MF9004-6AA (M13), dimensions in mm

Overview



The oval flange 7MF9408-2C, for pressure transmitters for absolute pressure and differential pressure has a ½-14 NPT female thread and is designed for max. operating pressure 400 bar (5800 psi).

Accessories

Accessory set for oval flange

- E36: 2 screws 7/16-20 UNF x 1½ inch to ASME B18.2.1, 1 flat gasket
- E34: 2 screws 7/16-20 UNF x 1½ inch to ASME B18.3, 1 O-ring (FPM 90)
- E13: 2 screws M10x40 to DIN EN 4762, 2 washers, 1 O-ring (FPM 90)
- E16: 2 screws M10x40 to DIN EN ISO 4762, 2 washers, 1 flat gasket

Washers Ø 10.5 to DIN 125

Flat gaskets made of PTFE, max. 420 bar (6092 psi), 80 °C (176 °F)

O-ring to DIN 3771, 20 x 2.65 – S – FPM90, max. 420 bar (6092 psi), 120 °C (248 °F)

Note: M10 screws only permissible up to PN 160 (2321 psi)!

Selection and Ordering data

Article No.

Oval flange

with female thread ½-14 NPT, max. working pressure 420 bar (6092 psi), flange connection to IEC 61518, form A

Material

P250GH, mat. No.: 1.0460

X 2 CrNiMo 17 13 2, mat. No. 1.4404/316L

7MF9408-2CE**7MF9408-2CL**

Selection and Ordering data

Order code

Article No.

Further designs¹⁾

Please add ***-Z*** to Article No. and specify Order code.

Accessory set to EN

2x screws 7/16-20 UNF x 1½ inch to ASME B 18.2.3; chromized steel
1x flat gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)

E36**7MF9408-5DA**

2x screws 7/16-20 UNF x 1½ inch to ASME B 18.2.3; chromized steel
1x O-ring to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)

E34**7MF9408-5CA****Accessory set to DIN**

2x screws M10x40 to DIN EN ISO 4762; chromized steel
2x washers Ø 10.5 mm to DIN 125;
1x O-ring to DIN 3771, 20 x 2.65 - S - FPM90, max. permissible 420 bar (6092 psi), 120 °C (248 °F)²⁾

E13**7MF9408-6AA**

2x screws M10x40 to DIN EN ISO 4762; chromized steel
2x washers Ø 10.5 mm to DIN 125;
1x flat gasket made of PTFE, max. permissible 420 bar (6092 psi), 80 °C (176 °F)²⁾

E16**7MF9408-6BA****NACE MR-0175-certified**

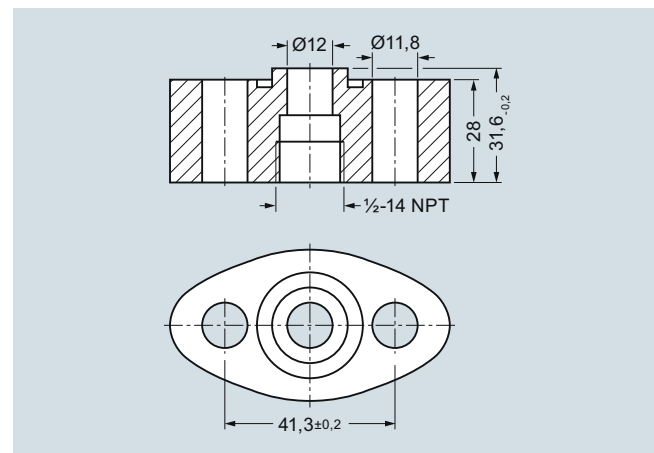
incl. acceptance test certificate 3.1 to EN 10204

D07

¹⁾ When ordering accessory set together with the oval flange, please use Order code; otherwise use Article No.

²⁾ Flange connections with M10 screws only permissible up to PN 160 (2321 psi)

Dimensional drawings



Oval flange 7MF9408-2C., dimensions in mm

Pressure Measurement

Fittings - Accessories

Adapters

Overview

Adapters enable e.g. a transition from medium connections with NPT thread to shut-off valves to DIN 16270 ... 16272 or pipes in conjunction with a connection gland (e.g. 7MF9008).

Design

The connection pieces are made of X 6 CrNiMoTi 17 12 2, mat. No. 1.4571 and available in 3 versions

- Thread 1/4-18 NPT and connection shank G1/2 to DIN EN 837-1
- Thread 1/2-14 NPT and connection shank G1/2 to DIN EN 837-1
- Thread 1/2-14 NPT and thread 1/2-14 NPT

Selection and Ordering data

Article No.

Adapter

(weight 0.2 kg)

with thread 1/4-18 NPT – G1/2

7MF9001-1AA

with thread 1/2-14 NPT – G1/2

7MF9001-1CA

with thread 1/2-14 NPT – 1/2-14 NPT

7MF9001-1DA

with thread 1/2-14 NPT – M20 x 1.5

7MF9001-1EAwith pipe union with ferrule 12 S,
Ø 12 mm – 1/2-14 NPT

- 9 SMnPb 28, mat. No. 1.0718

7MF9008-1CA

- X 6 CrNiMoTi 17 122, mat. No. 1.4571

7MF9008-1CBwith pipe union with ferrule 14 S,
Ø 14 mm – 1/2-14 NPT

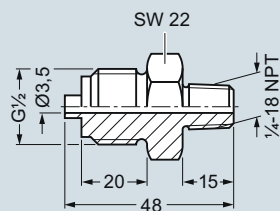
- 9 SMnPb 28, mat. No. 1.0718

7MF9008-1CC

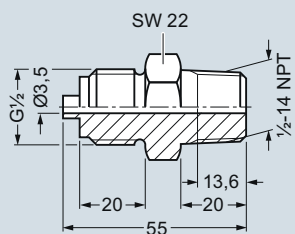
- X 6 CrNiMoTi 17 122, mat. No. 1.4571

7MF9008-1CD

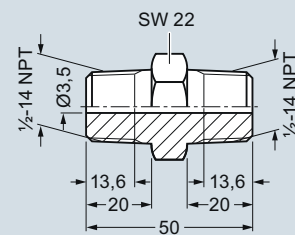
Dimensional drawings



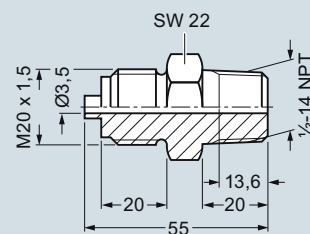
Connection piece with thread 1/4-18 NPT and connection shank G1/2 (7MF9001-1AA), dimensions in mm



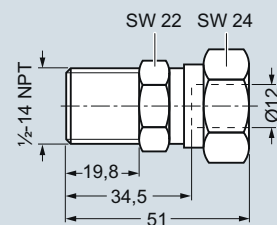
Connection piece with thread 1/2-14 NPT and connection shank G1/2 (7MF9001-1CA), dimensions in mm



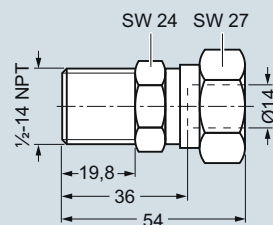
Connection piece with thread 1/2-14 NPT and thread 1/2-14 NPT (7MF9001-1DA), dimensions in mm



Connection piece with thread 1/2-14 NPT and connection shank M20 x 1.5 (7MF9001-1EA), dimensions in mm



Connection piece with pipe union with ferrule 12 S, Ø 12 mm and thread 1/2-14 NPT (7MF9008-1CA and -1CB), dimensions in mm



Connection piece with pipe union with ferrule 14 S, Ø 14 mm and thread 1/2-14 NPT (7MF9008-1CC and -1CD), dimensions in mm

Overview

Connection glands to connect medium or differential pressure lines to collars G $\frac{1}{2}$ to DIN EN 837-1

- For rated pressures up to PN 630 (9137psi)
- For oxygen only up to PN 250 (3626 psi)

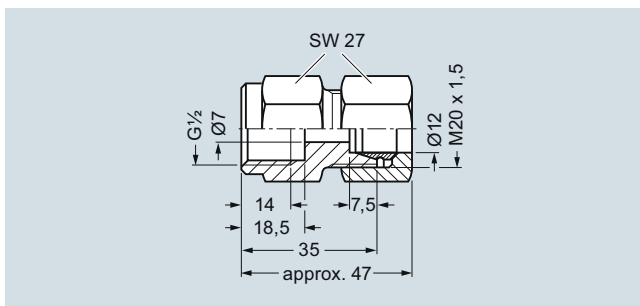
Selection and Ordering data

Article No.

Connection screwed gland for pipelines

(weight 0.2 kg)

Material	Design	Article No.
11SMn30 (mat. No. 1.0715)	Standard	7MF9008-1GA
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	Standard	7MF9008-1GB
X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)	Grease-free	7MF9008-1GC

Dimensional drawings


Connection gland 7MF9008-1G., dimensions in mm

Pressure Measurement

Fittings - Accessories

Connection parts G 1/2

Overview

Connection parts G $\frac{1}{2}$ for pressure gauges and shut-off fittings are available in 3 versions:

- Nipple connection
- Clamping sleeve
- Collar connection piece

Selection and Ordering data

Article No.

Adapters G $\frac{1}{2}$

for pressure gauges and shut-off fittings

Nipple connection

G $\frac{1}{2}$ to DIN 16284 (union nut with nipple and gasket); max. working pressure 400 bar (5802 psi); weight 0.1 kg; connection: G $\frac{1}{2}$ to DIN EN 837-1; Female thread G $\frac{1}{2}$

Material	Mat. No.
CuZn39Pb3	CW 614N

M56340-A0001

Union nut 9 SMn 28 k	1.0715
Nipple: RSt 37-2	1.0037

M56340-A0002

Union nut X 8 CrNiS 18 9	1.4305
Nipple: X 6 CrNiMoTi 17 12 2	1.4571/316Ti

M56340-A0003

Nipple connection

M20 x 1.5 to DIN 16284 (union nut with nipple and gasket); max. working pressure 400 bar (5802 psi); weight 0.1 kg; connection: M20 x 1.5 to DIN EN 837-1; Female thread M20 x 1.5

Material	Mat. No.
Union nut X 8 CrNiS 18 9	1.4305
Nipple: X 6 CrNiMoTi 17 12 2	1.4571/316Ti

M56340-A0008

Clamping sleeve

G $\frac{1}{2}$ to DIN 16283; max. working pressure 400 bar (5802 psi); weight 0.1 kg; Connections: G $\frac{1}{2}$ to DIN EN 837-1; Female thread: G $\frac{1}{2}$ right-hand G $\frac{1}{2}$ left-hand

Material	Mat. No.
CuZn39Pb3	CW614N
9 SMn 28 k	1.0715

M56340-A0004**M56340-A0005**

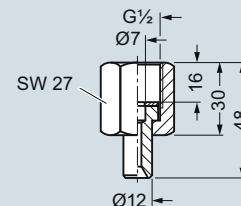
Collar-adapter

max. working pressure; weight 0.1 kg; Connections: G $\frac{1}{2}$ to DIN EN 837-1; Male thread: G $\frac{1}{2}$, G $\frac{1}{2}$

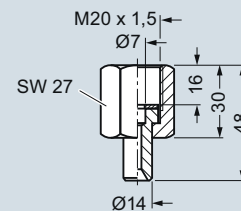
Material	Mat. No.
CuZn39Pb3	CW614N
9 SMn 28 k	1.0715

M56340-A0006**M56340-A0007**

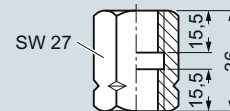
Dimensional drawings



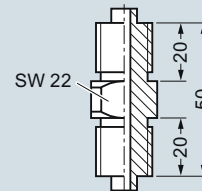
Nipple connection G $\frac{1}{2}$ (M56340-A0001 to -A0003), dimensions in mm



Nipple connection M20 x 1.5 (M56340-A0008), dimensions in mm



Clamping sleeve (M56340-A0004/-A0005), dimensions in mm



Collar connection piece (M56340-A0006/-A0007), dimensions in mm

Overview

Water traps protect pressure gauges and shut-off fittings from heating up (e.g. by steam) by the water column produced by the water trap.

The max. working temperature is 120 °C (248 °F) at 100 bar (1450 psi), 300 °C (572 °F) at 80 bar (1160 psi) or 400 °C (752 °F) at 63 bar (914 psi). If the temperature of the measured medium is higher, a sufficiently long line has to be connected upstream of the trap to enable heat dissipation.

Design

The water traps are available in U shape (type B) or circular shape (type D) to DIN 16282. They have a weld-on end \varnothing 20 mm \times 2.6 mm on the measurement side. The connection on the device side is a clamping sleeve $G\frac{1}{2}$ to DIN 16283.

The water traps are made of steel (P250GH) or stainless steel (X 6 CrNiMoTi 17 12 2)

Water traps are designed as standard for max. operating temperature 120 °C (248 °F) at max. operating pressure 100 bar (1450 psi) (300 °C (572 °F) at 80 bar (1160 psi), 400 °C (752 °F) at 63 bar (914 psi)). Water traps for higher operating pressures and temperatures are available on request.

Selection and Ordering data

Article No.

Water traps

for pressure gauges and pressure transmitters, max. working temperature 120 °C (248 °F), max. working pressure 100 bar (1450 psi) (or 300 °C (572 °F) at 80 bar (1160 psi), or 400 °C (752 °F) at 63 bar (914 psi)), weight 0.7 kg

Water trap B to DIN 16282

Material	Mat. No.
P235GH	1.0345
X 6 CrNiMoTi 17 12 2	1.4571/316Ti

M56340-A0043

M56340-A0061

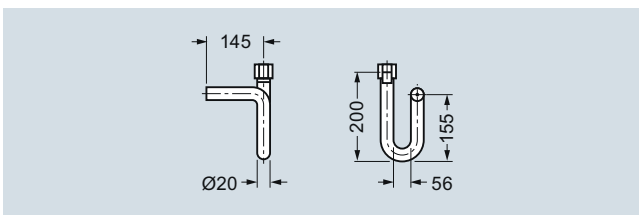
Water trap D to DIN 16282

Material	Mat. No.
P235GH	1.0345
X 6 CrNiMoTi 17 12 2	1.4571/316Ti

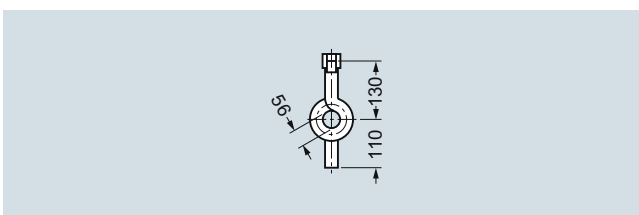
M56340-A0045

M56340-A0063

Dimensional drawings



Water traps, type B, M56340-A0043/-A0061, dimensions in mm

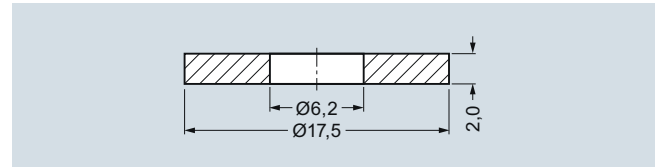


Water traps, type D, M56340-A0045/-A0063, dimensions in mm

Overview

The sealing rings to EN 837-1 are required to seal measuring instruments for pressure with the process connection $G\frac{1}{2}B$.

Dimensional drawings



Sealing ring 7MF9007-7A, to EN 837-1, dimensions in mm

Selection and Ordering data

Article No.

Sealing ring to EN 837-1 for thread $G\frac{1}{2}$ made of

(packing unit 100 pcs)

- Copper
- Soft iron
- Stainless steel, mat.-No. 1.4571
- PTFE

7MF9007-7AA

7MF9007-7AB

7MF9007-7AC

7MF9007-7AD

Accessories

Test report to EN 10204-3.1

7MF9000-8AB

Material acceptance test certificate to EN 10204-3.1

7MF9000-8AD

Pressure Measurement

Fittings - Accessories

Pressure surge reducers

Overview

The pressure surge reducer protects the pressure gauge against damage, premature wear and tear and inaccurate/fluctuating indications.

Application

The pressure reducer is used when pulsations occur in the measured medium (e.g. in slow-running vapor engines, piston pumps and compressors), or if drastic fluctuations are likely to occur in the measured medium (e.g. in hydraulic presses and tensile testing machines).

Design

- Enclosure made of brass or stainless steel (mat. no. 1.4571)
- Adjustable nozzle
- Sleeve for connection to the measuring instrument
- Pin for connection to supply lead

Selection and Ordering data

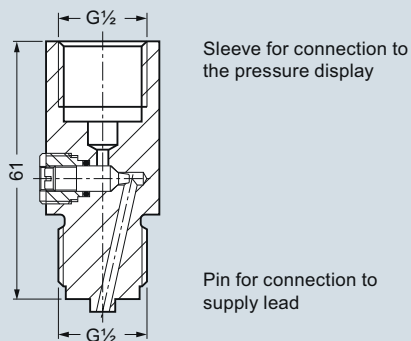
Article No.

Pressure surge reducer

Weight approx. 0.21 kg

Material	Full-scale value	Weight approx. in kg	Article No.
Brass	250 bar (3626 psi)	0.21	M56340-A54
Stainless steel	600 bar (8702 psi)	0.21	M56340-A59

Dimensional drawings



Pressure surge reducer, dimensions in mm

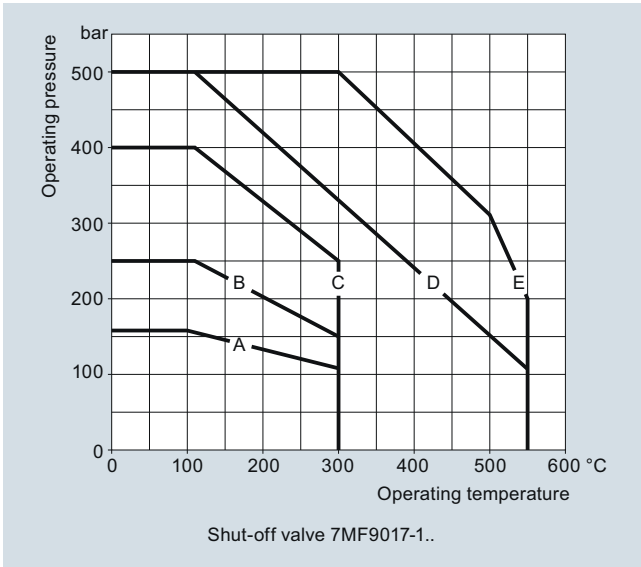
Overview

Primary shut-off valves are available in the following versions:

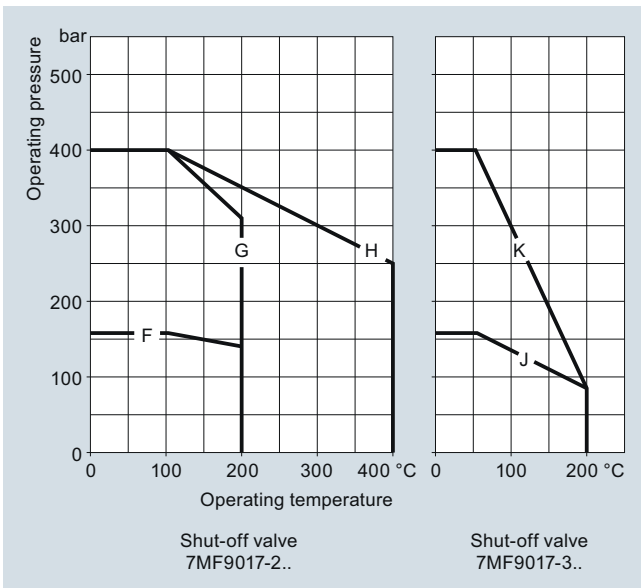
- For non-corrosive liquids, gases and vapors
- For corrosive liquids and gases
- Grease-free for oxygen

The shut-off valves are available in various materials and with various connections (see Selection and Ordering data)

Characteristic curves

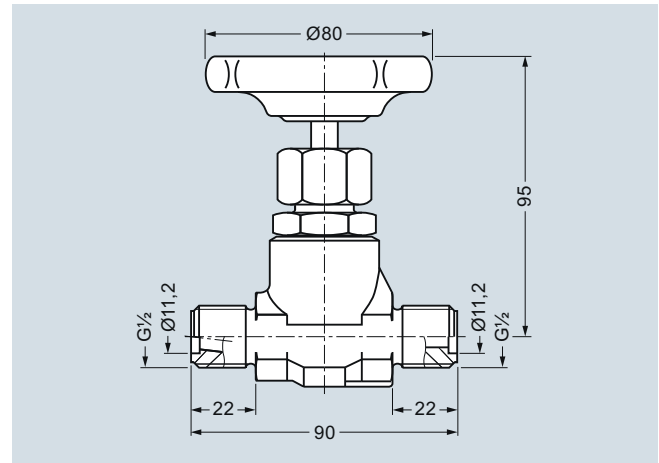


Shut-off valve 7MF9017-1.., permissible working pressure as a function of the permissible working temperature

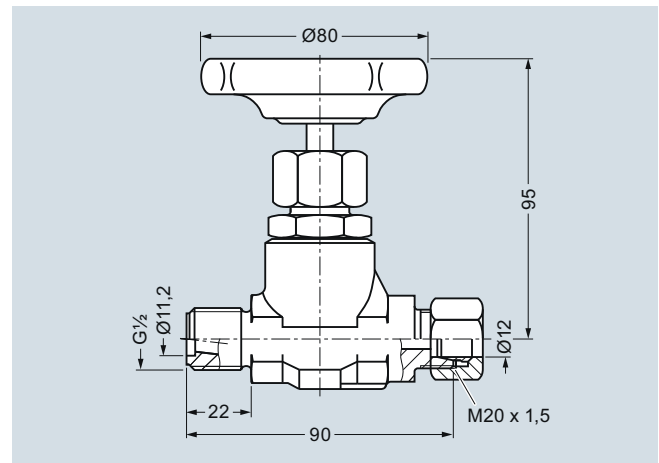


Shut-off valve 7MF9017-2.. and -3.., permissible working pressure as a function of the permissible working temperature

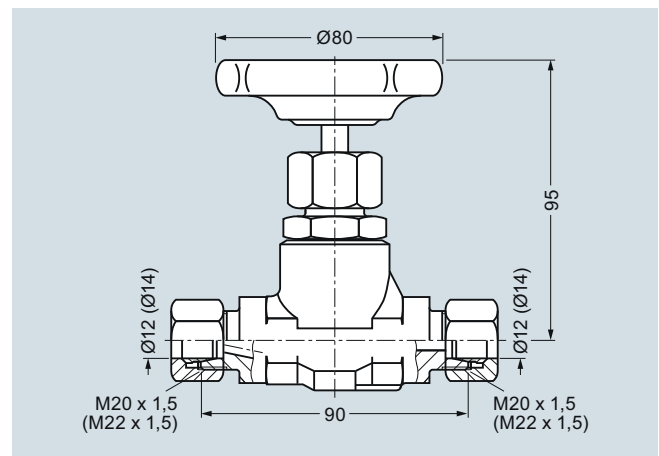
Dimensional drawings



Shut-off valve 7MF9017-1A., dimensions in mm



Shut-off valve 7MF9017-1B. and -2B., dimensions in mm

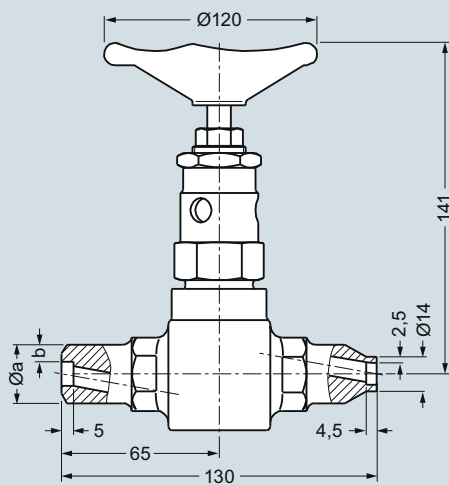


Shut-off valves 7MF9017-1C., -1D. and -2C., dimensions in mm

Pressure Measurement

Fittings - Accessories

Primary shut-off valves



Shut-off valves 7MF9017-, dimensions in mm

Ø A x b	7MF9017-
14 mm x 2.5 mm	1F. and 1G.
21.3 mm x 6.3 mm	1H. and 2H.
24 mm x 7.1 mm	1J., 1K. and 2J.

Selection and Ordering data

Primary shut-off valves, without certificate

Max. working pressure	Charac-teristic ¹⁾	Material	Mat. No.	Spindle thread	Connections	Approx. weight kg	Article No.
Shut-off valve for non-aggressive liquids, gases and vapors							7MF9017-1
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.							
160 bar (2321 psi)	A	P250GH	1.0460	Internal	Threaded socket G½ form R, DIN 19207	0.8	A
160 bar (2321 psi)	A	P250GH	1.0460	Internal	Threaded socket G½ form R, DIN 19207 and pipe union with ferrule for pipe Ø 12 mm, S series	0.8	B
400 bar (5800 psi)	C	P250GH	1.0460	Internal	Pipe union with ferrule for pipe Ø 12 mm, S series	1	C
400 bar (5800 psi)	C	P250GH	1.0460	Internal	Pipe union with ferrule for pipe Ø 14 mm, S series	1	D
500 bar (7252 psi)	D	16 Mo 3	1.5415	External	Welding sleeves Ø 14 mm x 2.5 mm	1.6	F
500 bar (7252 psi)	E	11 CrMo 9 10	1.7383	External	Welding sleeves Ø 14 mm x 2.5 mm	1.6	G
500 bar (7252 psi)	D	16 Mo 3	1.5415	External	Welding sleeves Ø 21.3 mm x 6.3 mm and Ø 14 mm x 2.5 mm	1.6	H
500 bar (7252 psi)	D	16 Mo 3	1.5415	External	Welding sleeves Ø 24 mm x 7.1 mm and Ø 14 mm x 2.5 mm	1.6	J
500 bar (7252 psi)	E	11 CrMo 9 10	1.7383	External	Welding sleeves Ø 24 mm x 7.1 mm and Ø 14 mm x 2.5 mm	1.6	K
Shut-off valve for aggressive liquids and gases							7MF9017-2
160 bar (2321psi)	F	X 6 CrNiMoTi 17 12 2	1.4571/316Ti	Internal	Threaded socket G½ form R, DIN 19207 and pipe union with ferrule for pipe Ø 12 mm, S series	0.8	B
400 bar (5800 psi)	G	X 6 CrNiMoTi 17 12 2	1.4571/316Ti	Internal	Pipe union with ferrule for pipe Ø 12 mm, S series	1	C
400 bar (5800 psi)	H	X 6 CrNiMoTi 17 12 2	1.4571/316Ti	External	Welding sleeves Ø 21.3 mm x 6.3 mm and Ø 14 mm x 2.5 mm	1.6	H
400 bar (5800 psi)	H	X 6 CrNiMoTi 17 12 2	1.4571/316Ti	External	Welding sleeves Ø 24 mm x 7.1 mm and Ø 14 mm x 2.5 mm	1.6	J

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

7MF9000-8AB
7MF9000-8AD

¹⁾ See Figure "Permissible working pressure as a function of the permissible working temperature"

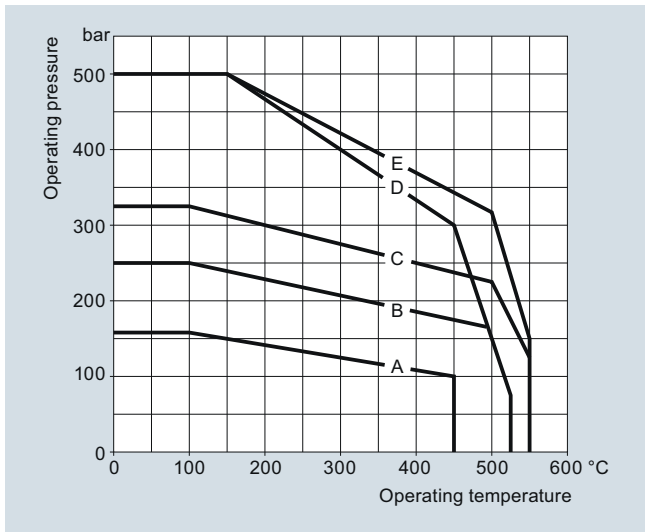
Overview

The compensation vessels prevent the level difference which occurs with pressure changes in the pressure lines and which falsifies the measurement.

According to DIN 19211, the temperature in the compensation vessel must be assumed to be 50 K less than the steam temperature in the pipe when calculating the wall thicknesses. This is because the temperature in the compensation vessel during operation can only rise up to the saturated steam temperature.

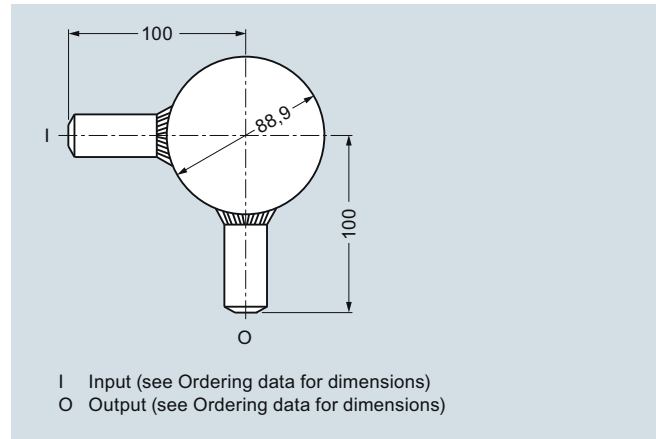
A material acceptance test certificate A to EN 10204-3.1 is available for the materials from which the compensation vessels are made.

Characteristic curves

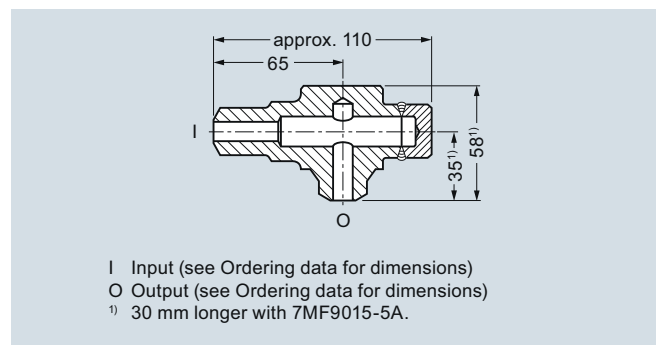


Permissible operating pressure as a function of the permissible operating temperature

Dimensional drawings



Compensation vessel 7MF9015-1..., dimensions in mm



Compensation vessel 7MF9015-5..., dimensions in mm

Selection and Ordering data

Compensation vessel, without certificate

Max. working pressure	Charac- teristic ¹⁾	Material	Mat. No.	Connections Input	Output	Approx. contents cm ³	Approx. weight kg	Article No.
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.								
160 bar (2321 psi)	A	16 Mo 3	1.5415	Threaded socket G ¹ / ₂ , form R, DIN 19207	Threaded socket G ¹ / ₂ , form V, DIN 19207	250	0.8	7MF9015-1A
250 bar (3626 psi)	B	16 Mo 3	1.5415	Welding sleeve Ø 21.3 mm × 6.3 mm	Welding sleeve Ø 21.3 mm × 6.3 mm	250	0.8	1B
250 bar (3626 psi)	B	16 Mo 3	1.5415	Welding sleeve Ø 24 mm × 7.1 mm	Welding sleeve Ø 24 mm × 7.1 mm	250	1	1C
500 bar (7252 psi)	E	11 CrMo 9 10	1.7383	Welding sleeve Ø 24 mm × 7.1 mm	Welding sleeve Ø 24 mm × 7.1 mm	170	1	1D
250 bar (3626 psi)	B	16 Mo 3	1.5415	Welding sleeve Ø 33.7 mm × 4.5 mm	Welding sleeve Ø 24 mm × 7.1 mm	700	0.7	1E
160 bar (2321 psi)	A	16 Mo 3	1.5415	Threaded socket G ¹ / ₂ , form R, DIN 19207	Threaded socket G ¹ / ₂ , form V, DIN 19207	20	1.6	5A
500 bar (7252 psi)	D	16 Mo 3	1.5415	Welding sleeve Ø 21.3 mm × 6.3 mm	Welding sleeve Ø 21.3 mm × 6.3 mm	20	1.6	5B
500 bar (7252 psi)	D	16 Mo 3	1.5415	Welding sleeve Ø 24 mm × 7.1 mm	Welding sleeve Ø 24 mm × 7.1 mm	20	1.6	5C
500 bar (7252 psi)	E	11 CrMo 9 10	1.7383	Welding sleeve Ø 24 mm × 7.1 mm	Welding sleeve Ø 24 mm × 7.1 mm	20	1.6	5D

Accessories

Factory test certificate EN 10204-2.2

Material acceptance test certificate EN 10204-3.1

1) See Figure "Permissible working pressure as a function of the permissible working temperature"

7MF9000-8AB
7MF9000-8AD

Pressure Measurement

Fittings - Accessories

Connection parts

1

Overview

Connection parts are available in the following versions:

- Threaded flange pair G $\frac{1}{2}$ with stainless steel gasket
- Nipple G $\frac{1}{2}$ form V to DIN 19207
- Union nut G $\frac{1}{2}$ made of C 35 to DIN 16284
- Gasket B $\frac{1}{2}$ (grooved) to DIN 19207

All connection parts are also available grease-free for oxygen.

Selection and Ordering data

Article No.

Threaded flange pair G $\frac{1}{2}$

- with stainless steel gasket
- grease-free for oxygen, with stainless steel gasket

Scope of delivery:

2x threaded flanges G $\frac{1}{2}$ to DIN 19207; material: P250GH (mat. No. 1.0460)

4x hexagon screws M10x45 to DIN EN 24014; Material: C35E (mat. No. 1.1181)

4x hexagon screws M10x50 to DIN EN 24032

1x gasket G $\frac{1}{2}$ (7MF9007-6BA) grooved, to DIN 19207;

Material: X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)

Only for 7MF9007-4CA!

1x gasket G $\frac{1}{2}$ (7MF9007-6CA), grease-free for oxygen, grooved, to DIN 19207;

Material: X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)

Only for 7MF9007-4DA!

7MF9007-4CA**7MF9007-4DA**

Nipple G $\frac{1}{2}$

to DIN 19207

- Material: 16 Mo 3 (mat. No. 1.5415)
- grease-free for oxygen, Material: X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)

7MF9007-4KA**7MF9007-4LA**

Union nut G $\frac{1}{2}$

to DIN 16284

- Material: C35E (mat. No. 1.1181)
- grease-free for oxygen, Material: X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)

7MF9007-4MA**7MF9007-4NA**

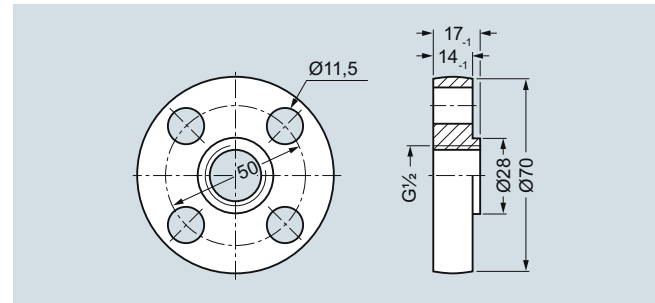
Gasket G $\frac{1}{2}$

to DIN 19207, grooved

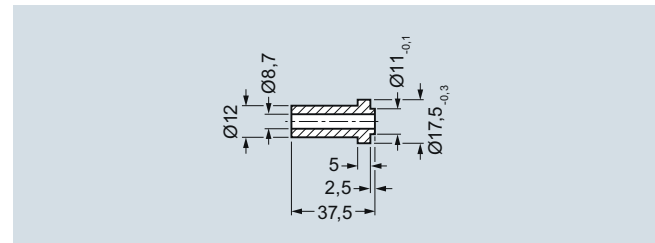
- Material: X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)
- grease-free for oxygen, Material: X 6 CrNiMoTi 17 12 2 (mat. No. 1.4571/316Ti)

7MF9007-6BA**7MF9007-6CA**

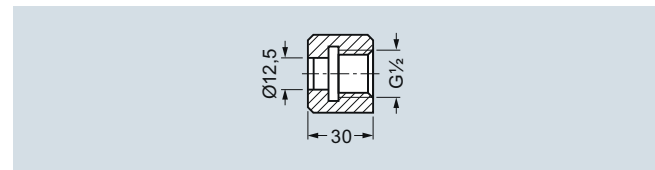
Dimensional drawings



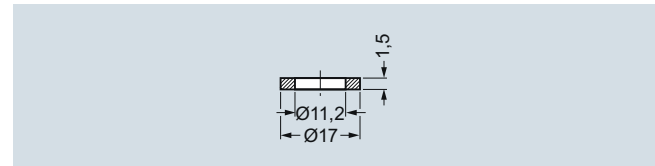
Threaded flange 7MF9007-4CA/-4DA, dimensions in mm



Nipple G $\frac{1}{2}$ 7MF9007-4KA/-4LA, dimensions in mm



Union nut G $\frac{1}{2}$ 7MF9007-4MA/-4NA, dimensions in mm



Gasket 7MF9007-6BA/-6CA, dimensions in mm

Temperature Measurement

2/2 **Product overview****Transmitters for mounting in sensor head**

- 2/7 SITRANS TH100 two-wire system (Pt100)
- 2/11 SITRANS TH200 two-wire system universal
- 2/18 SITRANS TH300 two-wire system universal, HART
- 2/25 SITRANS TH400 fieldbus transmitter

Transmitters for rail mounting

- 2/31 SITRANS TR200 two-wire system universal
- 2/38 SITRANS TR300 two-wire system universal, HART
- 2/45 SITRANS TW four-wire system universal, HART

Transmitters for field mounting

- 2/57 SITRANS TF280 WirelessHART
- 2/62 SITRANS TF two-wire system
- 2/71 SITRANS TF fieldbus transmitter

Field indicator

- 2/62 SITRANS TF Field indicator for 4 to 20 mA

SITRANS TS

- 2/78 Technical description
- 2/100 Detailed product overview
- 2/105 Conversion assistance old appliance
- 2/109 Ordering examples

SITRANS TS100

- 2/110 Cable, mineral-insulated

SITRANS TS200

- 2/114 Compact, mineral-insulated

SITRANS TS300

- for food, pharmaceuticals and biotechnology
- 2/118 - Modular build
- 2/122 - Clamp-on build

SITRANS TS500

- 2/126 Type 2, tubular version without process connection
- 2/130 Type 2N, tubular version, with screw socket
- 2/134 Type 2G, tubular version, with screw socket and extension
- 2/138 Type 2F, tubular version, with flange and extension
- 2/142 Type 3, tubular quick, without process connection
- 2/146 Type 3G, tubular quick, with screw socket and extension
- 2/150 Type 3F, tubular quick, with flange and extension
- 2/154 Type 4+4F barstock thermowell, with extension
- 2/158 For the installation of existing protective tubes

SITRANS TSinsert

- 2/162 Measuring inserts for retrofits and upgrades - European and American type

Resistance thermometers

- 2/166 Temperature transmitters for mounting in the connection head
- 2/167 Questionnaire for temperature sensors (resistance thermometers and thermocouples)
- 2/168 Flue gas resistance thermometers, with connection head
- 2/169 Resistance thermometers for damp rooms
- 2/170 Accessories – Welding-type protective tubes, neck tubes and connection heads

Thermocouples







- 2/172 Technical description
- Straight thermocouples
- 2/173 - to DIN 43733, with connection head
- 2/174 - Individual parts and accessories






You can download all instructions, catalogs and certificates for SITRANS T free of charge at the following Internet address: www.siemens.com/sitranst

Temperature Measurement

Product overview

Overview


	Application	Mounting of transmitter with Ex protection		Page	Software for parameterization
		Transmitter	Sensor		
Temperature transmitter for head mounting					
	SITRANS TH100 Transmitters for Pt100 <ul style="list-style-type: none"> • Two-wire system 	zone 2 and zone 1	zone 2, zone 1 and zone 0	2/7	SIPROM T
	SITRANS TH200 Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 1.1 V <ul style="list-style-type: none"> • Two-wire system • Universal 	zone 2 and zone 1	zone 2, zone 1 and zone 0	2/11	SIPROM T
	SITRANS TH300 Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 1.1 V <ul style="list-style-type: none"> • Two-wire system • Universal • HART 	zone 2 and zone 1	zone 2, zone 1 and zone 0	2/18	SIMATIC PDM
	SITRANS TH400 Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 0.9 V <ul style="list-style-type: none"> • Fieldbus transmitters • PROFIBUS PA • FOUNDATION fieldbus 	zone 2, zone 1 and zone 21	zone 2, zone 1, zone 0, zone 21, zone 20	2/25	SIMATIC PDM for TH 400 with PROFIBUS PA
Temperature transmitters for rail mounting					
	SITRANS TR200 Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 1.1 V <ul style="list-style-type: none"> • Two-wire system • Universal 	zone 2, zone 1 and zone 21	zone 2, zone 1, zone 0, zone 21, zone 20	2/31	SIPROM T
	SITRANS TR300 Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 1.1 V <ul style="list-style-type: none"> • Two-wire system • Universal • HART 	zone 2, zone 1 and zone 21	zone 2, zone 1, zone 0, zone 21, zone 20	2/38	SIMATIC PDM








	Application	Mounting of transmitter with Ex protection		Page	Software for parameterization
		Transmitter	Sensor		
	<p>SITRANS TW</p> <p>Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples, DC voltages and DC currents for:</p> <ul style="list-style-type: none"> • Four-wire system 	Safe area	zone 1, zone 0, zone 21, zone 20	2/45	SIMATIC PDM
Temperature transmitters for field mounting					
	<p>SITRANS TF280</p> <p>Transmitter for connection to resistance-based sensor</p> <ul style="list-style-type: none"> • In field enclosure for heavy industrial use • battery-operated • WirelessHART 	-	-	2/57	Local operation via buttons SIMATIC PDM local with HART modem and wireless via WirelessHART
	<p>SITRANS TF</p> <p>Transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 1.1 V</p> <ul style="list-style-type: none"> • In field enclosure for heavy industrial use • HART, Universal 	Zone 2 and zone 1	zone 2, zone 1 and zone 0	2/62	depending on the installed TH200/TH300 transmitter
	<p>SITRANS TF</p> <p>Fieldbus transmitters for connection to resistance thermometers, resistance-based sensors, thermocouples and DC voltages up to 0.8 V</p> <ul style="list-style-type: none"> • In field enclosure for heavy industrial use • PROFIBUS PA • FOUNDATION fieldbus 	Zone 2 and zone 1	zone 2, zone 1 and zone 0	2/71	SIMATIC PDM for PROFIBUS PA
Field indicator for 4 to 20 mA signals					
	<p>SITRANS TF</p> <p>Field indicator for 4 to 20 mA signals</p> <p>Display of units can be user-defined</p>	Zone 2 and zone 1	-	2/62	--

Temperature Measurement

Product overview

2


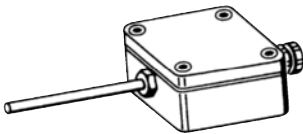

	Type	Description	Page	Software for parameterization
Measuring inserts for temperature sensors				
	European type	<ul style="list-style-type: none"> • Replaceable • Mineral-insulated 	2/162	-
	American type		2/164	-
Temperature sensors				
	TS100	<ul style="list-style-type: none"> • Cable connection • Universal use • For unfavorable space conditions • Mineral-insulated 	2/110	-
	TS200	<ul style="list-style-type: none"> • Compact version • Universal use • Mineral-insulated • For unfavorable space conditions 	2/114	-
				
				
	TS300	Resistance thermometer for food, pharmaceuticals and biotechnology	2/118	-
				
	TS500, Type 2	<ul style="list-style-type: none"> • For the process industry (piping and tanks) • Tubular thermowell for minimal to medium stress • Thermowell as per DIN 43772, Type 2 without process connection • Without extension, plug-in or use with moveable compression fittings 	2/126	-
	TS500, Type 2N	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Tubular thermowell for minimal to medium stress • Thermowell Type 2N similar to DIN 43772, screwed in • Without extension, connection head not adjustable 	2/130	-
	TS500, Type 2G	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Tubular version for minimal to medium stress • Thermowell as per DIN 43722, Type 2G, screwed in • With extension 	2/134	-

	Type	Description	Page	Software for parameterization
	TS500, Type 2F	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Tubular version for minimal to medium stress • Thermowell as per DIN 43722, Type 2F with flange • With extension 	2/138	-
	TS500, Type 3	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Tubular thermowell for minimal to medium stress • Thermowell as per DIN 43722, Type 3 without process connection, improved response time • Without extension, plug-in or use with moveable compression fittings 	2/142	-
	TS500, Type 3G	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Tubular version for minimal to medium stress • Thermowell as per DIN 43722, Type 3G, screwed in, improved response time • With extension 	2/146	-
	TS500, Type 3F	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Tubular thermowell for minimal to medium stress • Thermowell as per DIN 43722, Type 3F with flange, improved response time • With extension X 	2/150	-
 	TS500, Type 4 TS500, Type 4F	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • Barstock thermowell for medium to highest stress • Thermowell as per DIN 43722 • Type 4 for weld-in • Type 4F with flange 	2/154	-
	TS500, installation	<ul style="list-style-type: none"> • For the process industry (vessels and pipings) • For the installation of existing thermowells • Suitable for thermowells as per DIN 43772 as well as ASME B40.9-2001 • With European or American type extension 	2/158	-

Temperature Measurement

Product overview

2

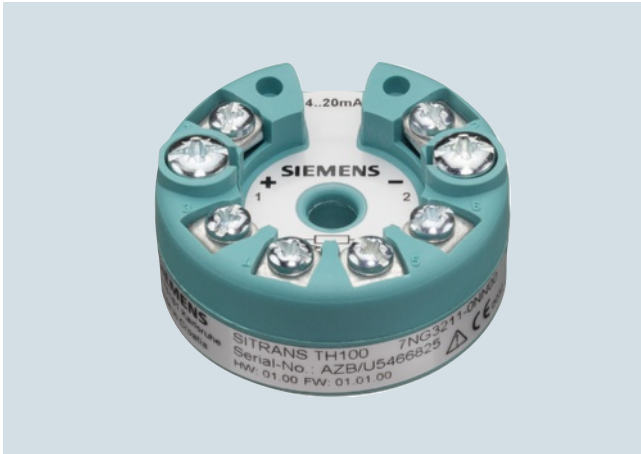
	Measuring instrument	Largest measuring range	Page
Temperature sensors for combustion processes and damp rooms			
	Flue gas resistance thermometers	-50 ... +600 °C (-58 ... +1112 °F)	2/168
	Resistance thermometers for damp rooms	-30 ... +60 °C (-22 ... +140 °F)	2/169
	Straight thermocouples	0 ... 1250 °C (32 ... 2282 °F)	2/173

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

Overview



The SITRANS TH100 dispenses with electrical isolation and universal sensor connection to provide a low-cost alternative for Pt100 measurements.

For the parameterization, the SIPROM T software is used in combination with the modem for SITRANS TH100/TH200.

Its extremely compact design makes the SITRANS TH100 ideal for the retrofitting of measuring points or for the use of analog transmitters.

The transmitter is available as a non-Ex version as well as for use in potentially explosive atmospheres.

Benefits

- Two-wire transmitter
- Assembly in connection head type B (DIN 43729) or larger, or on a standard DIN rail
- Can be programmed, which means that the sensor connection, measuring range, etc. can also be programmed
- Intrinsically-safe version for use in potentially explosive areas

Application

Used in conjunction with Pt100 resistance thermometers, the SITRANS TH100 transmitters are ideal for measuring temperatures in all industries. Due to its compact size it can be installed in the connection head type B (DIN 43729) or larger.

The output signal is a direct current from 4 to 20 mA that is proportional to the temperature.

Parameterization is implemented over the PC using the parameterization software SIPROM T and the modem for SITRANS TH100/TH200. If you already have a "modem for SITRANS TK" (Article No. 7NG3190-6KB), you can continue using this to parameterize the SITRANS TH100.

Transmitters of the "intrinsically-safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX), as well as FM and CSA regulations.

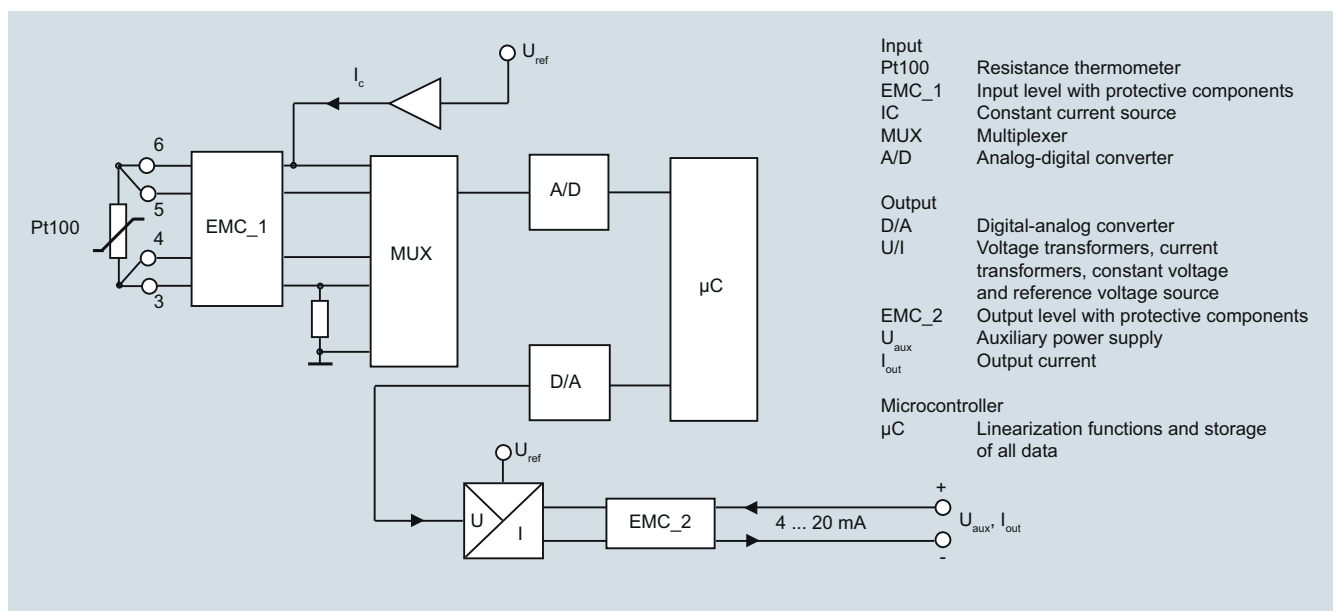
Function

Mode of operation

The measured signal supplied by a Pt100 resistance thermometer (2, 3 or 4-wire system) is amplified in the input stage. The voltage, which is proportional to the input variable, is then converted into digital signals by a multiplexer in an analog/digital converter. They are converted in the microcontroller in accordance with the sensor characteristics and further parameters (measuring range, damping, ambient temperature etc.).

The signal prepared in this way is converted in a digital/analog converter into a load-independent direct current of 4 to 20 mA.

An EMC filter protects the input and output circuits against electromagnetic interferences.



SITRANS TH100, function diagram

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

Technical specifications

Input

Resistance thermometer	
Measured variable	Temperature
Sensor type	PT100 to IEC 60751
Characteristic curve	Temperature-linear
Type of connection	2-, 3- or 4-wire circuit
Resolution	14 bit
Measuring accuracy	
• Span <250 °C (450 °F)	< 0.25 °C (0.45 °F)
• Span >250 °C (450 °F)	< 0.1 % of span
Repeatability	< 0.1 °C (0.18 °F)
Measuring current	approx. 0.4 mA
Measuring cycle	< 0.7 s
Measuring range	-200 ... +850 °C -328 ... +1562 °F)
Measuring span	25 ... 1050 °C (77 ... 1922 °F)
Unit	°C or °F
Offset	programmable: -100 ... +100 °C (-180 ... +180 °F)
Line resistance	Max. 20 Ω (total from feeder and return conductor)
Noise rejection	50 and 60 Hz

Output

Output signal	4 ... 20 mA, two-wire
Auxiliary power	8.5 ... 36 V DC (30 V for Ex ia and ib; 32 V for Ex nL/ic; 35 V for Ex nA)
Max. load	($U_{aux} - 8.5 \text{ V}$)/0.023 A
Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.84 ... 20.5 mA)
Error signal (following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default range: 3.6 mA or 22.8 mA)
Damping time	0 ... 30 s (default value: 0 s)
Protection	Against reversed polarity
Resolution	12 bit
Accuracy at 23 °C (73.4 °F)	< 0.1 % of span
Temperature effect	< 0.1 %/10 °C (0.1 %/18 °F)
Effect of auxiliary power	< 0.01 % of span/V
Effect of load impedance	< 0.025 % of max. span/100 Ω
Long-term drift	<ul style="list-style-type: none"> < 0.025 % of the max. span in the first month < 0.035 % of the max. span after one year < 0.05 % of the max. span after 5 years

Ambient conditions

Ambient temperature range	-40 ... +85 °C (-40 ... +185 °F)
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	98 %, with condensation
Electromagnetic compatibility	According to EN 61326 and NAMUR NE21

Construction

Weight	50 g
Dimensions	See dimensional drawing
Material	Molded plastic
Cross-section of cables	Max. 2.5 mm ² (AWG 13)
Degree of protection to IEC 60529	
• Enclosure	IP40
• Terminals	IP00

Certificates and approvals

Explosion protection ATEX

EC type test certificate

• "Intrinsic gas safety" type of protection

• "Non-sparking" type of protection

• "Intrinsic dust safety" type of protection

Explosion protection FM for USA and Canada (c_{FMUS})

• FM approval

• Degree of protection

Other certificates

Software requirements for SIPROM T

PC operating system

PTB 05 ATEX 2049X

II 1 G Ex ia IIC T6/T4

II (1) 2 G Ex ib [ia Ga] IIC T6/T4 Gb

II (1) 3 G Ex ic [ia Ga] IIC T6/T4 Gc

II 3 G Ex ic IIC T6/T4 Gc

II 3 G Ex nA IIC T6/T4 Gc

II 3 G Ex nA[ic] IIC T6/T4 Gc

II 1 D Ex ia IIIC T115 °C Da

PID 3024169

IS CI I, II, III, Div 1, GP ABCDEFG T4/T5/T6

CI I, ZN 0,1 AEx ia IIC T4/T5/T6

NI CI I, II, III, Div 2, GP ABCDFG T4/T5/T6

CI I, ZN 2, NI IIC T4/T5/T6

GOST, NEPSI, PESO

Windows ME, 2000, XP, Win 7 and Win 8; can also be used in connection with RS 232 modem under Windows 95, 98 and 98SE

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

Selection and Ordering data

Article No.

SITRANS TH100 temperature transmitters for Pt100

for installation in connection head, type B (DIN 43729), two-wire system, 4 ... 20 mA, programmable, without electrical isolation

- Without explosion protection ▶ ◆ **7NG3211-0NN00**
- With explosion protection "Intrinsic safety" type of protection and for zone 2
 - to ATEX ▶ ◆ **7NG3211-0AN00**
 - to FM (cFM_{US}) ▶ ◆ **7NG3211-0BN00**

Further designs

Order code

Add **"-Z"** to Article No. and specify Order code(s)

Test report (5 measuring points)

C11

Customer-specific programming

Add **"-Z"** to Article No. and specify Order code(s)

Measuring range to be set

Specify in plain text (max. 5 digits):

Y01: ... to ... °C, °F

Y01¹⁾

Measuring point no. (TAG), max. 8 characters

Y17²⁾

Measuring point descriptor, max. 16 characters

Y23²⁾Pt100 (IEC) 2-wire, $R_L = 0 \Omega$ **U02³⁾**

Pt100 (IEC) 3-wire

U03³⁾

Pt100 (IEC) 4-wire

U04³⁾

Special differing customer-specific programming, specify in plain text

Y09⁴⁾

Fail-safe value 3.6 mA (instead of 22,8 mA)

U36²⁾

Accessories

Article No.

Modem for SITRANS TH100, TH200, TR200 and TF with TH200 incl. SIPROM T parameterization software ▶

With USB connection

7NG3092-8KU

MiniDVD for temperature measuring instruments ▶

With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software

A5E00364512

DIN rail adapters for head transmitters ▶

(Quantity delivered: 5 units)

7NG3092-8KA

Connecting cable

4-wire, 150 mm, for sensor connections when using head transmitters in the high hinged cover (set with 5 units)

7NG3092-8KC

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

- 1) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.
- 2) For this selection, Y01 or Y09 must also be selected.
- 3) For this selection, Y01 must also be selected.
- 4) For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Supply units see Chapter "Supplementary Components".

Ordering example

7NG3211-0NN00-Z Y01+Y23+U03

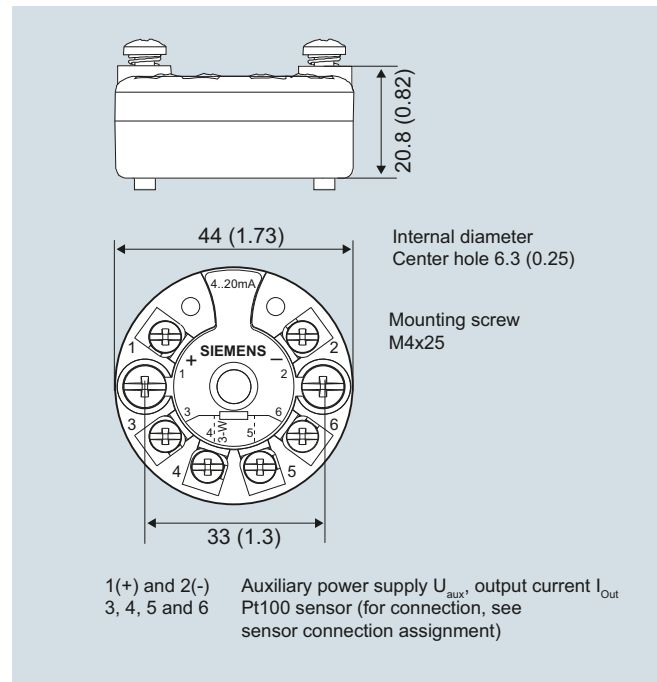
Y01: -10 ... +100 °C

Y23: TICA1234HEAT

Factory setting:

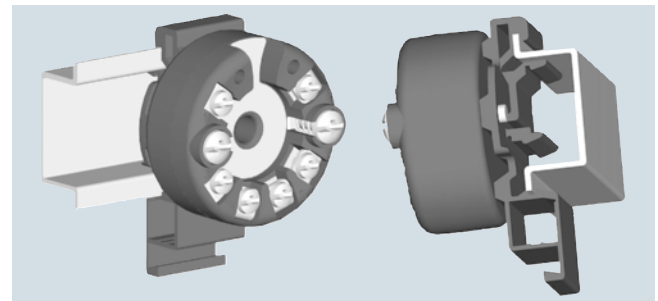
- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °C)
- Error signal in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Dimensional drawings

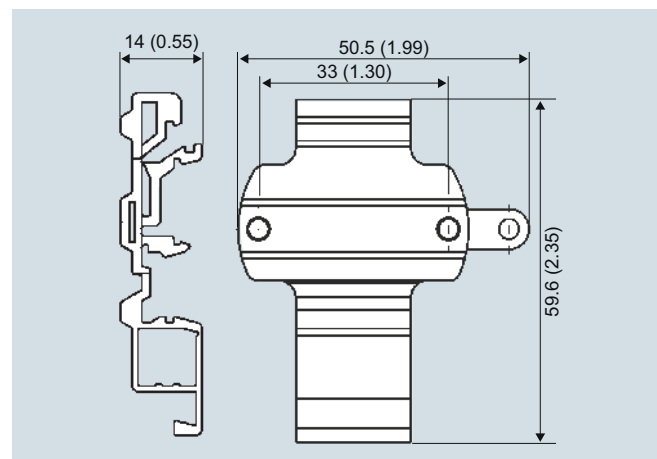


SITRANS TH100, dimensions in mm (inch)

Mounting on DIN rail



SITRANS TH100, mounting of transmitter on DIN rail



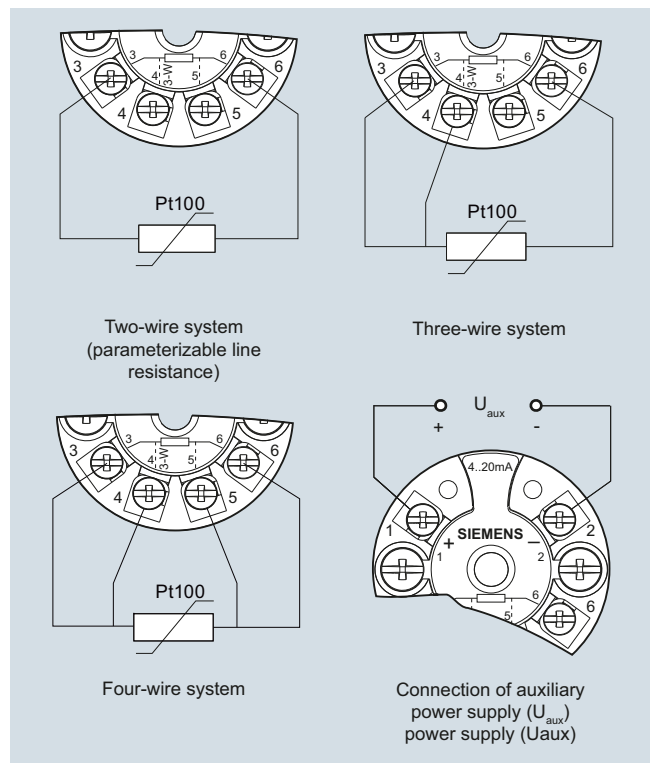
DIN rail adaptor, dimensions in mm (inch)

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

Schematics



SITRANS TH100, sensor connection assignment

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH200 two-wire system, universal

Overview



Ultra flexible - with the universal SITRANS TH200 transmitter

- Two-wire devices for 4 to 20 mA
- Mounting in the connection head of the temperature sensor
- Universal input for virtually any type of temperature sensor
- Configurable over PC

Benefits

- Compact design
- Flexible mounting and center hole allow you to select your preferred type of installation
- Electrically isolated
- Test sockets for multimeters
- Diagnostics LED (green/red)
- Sensor monitoring open circuits and short-circuits
- Self-monitoring
- Configuration status stored in EEPROM
- SIL2 (with Order Code C20), SIL2/3 (with C23)
- Expanded diagnostic functions, such as slave pointer, operating hours counter, etc.
- Special characteristic
- Electromagnetic compatibility to EN 61326 and NE21

Application

SITRANS TH200 transmitters can be used in all industrial sectors. Due to their compact size they can be installed in the connection head type B (DIN 43729) or larger. The following sensors/signal sources can be connected over their universal input module:

- Resistance thermometers (2, 3 or 4-wire system)
- Thermocouples
- Resistance-based sensors and DC voltage sources

The output signal is a direct current from 4 to 20 mA in accordance with the sensor characteristic.

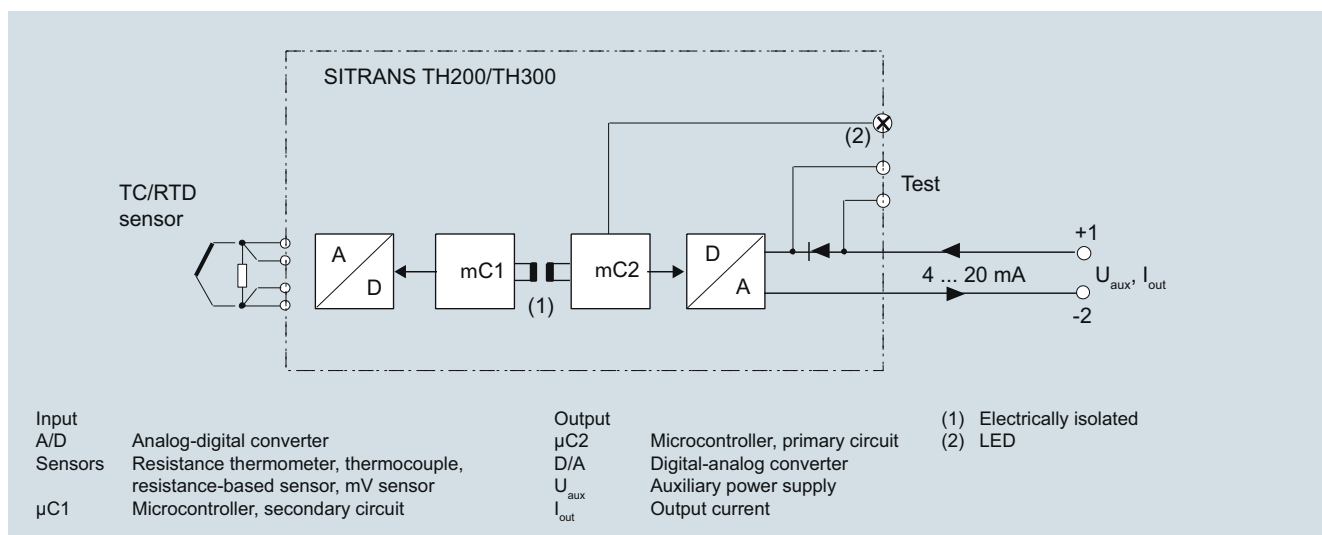
Transmitters of the "intrinsically safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX), as well as FM and CSA regulations.

Function

The SITRANS TH200 is configured over a PC. A USB or RS 232 modem is linked to the output terminals for this purpose. The configuration data can now be edited using the SIPROM T software tool. The configuration data are then permanently stored in the non-volatile memory (EEPROM).

Once the sensors and power supply have been correctly connected, the transmitter outputs a temperature-linear output signal and the diagnostics LED displays a green light. In the case of a sensor short-circuit, the LED flashes red, an internal device fault is indicated by a steady red light.

The test socket can be used to connect an ammeter at any time for monitoring purposes and plausibility checks. The output current can be read without any interruption, or even without opening the current loop.



SITRANS TH200 function diagram

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH200 two-wire system, universal

Technical specifications

Input

Resistance thermometer

Measured variable	Temperature
Sensor type	
<ul style="list-style-type: none"> to IEC 60751 To JIS C 1604; $\alpha = 0.00392 \text{ K}^{-1}$ to IEC 60751 Special type 	Pt25 ... Pt1000 Pt25 ... Pt1000 Ni25 ... Ni1000 over special characteristic (max. 30 points)
Sensor factor	0.25 ... 10 (adaptation of the basic type, e.g. Pt100 to version Pt25 ... 1000)
Units	°C or °F
Connection	
<ul style="list-style-type: none"> Standard connection Generation of average value Generation of difference 	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system 2 identical resistance thermometers in 2-wire system for generation of average temperature 2 identical resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)
Interface	
<ul style="list-style-type: none"> Two-wire system Three-wire system Four-wire system 	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance) No balancing required No balancing required
Sensor current	$\leq 0.45 \text{ mA}$
Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: ON)
Measuring range	parameterizable (see table "Digital measuring errors")
Min. measured span	10 °C (18 °F)
Characteristic curve	Temperature-linear or special characteristic

Resistance-based sensors

Measured variable	Actual resistance
Sensor type	Resistance-based, potentiometers
Units	Ω
Connection	
<ul style="list-style-type: none"> Normal connection Generation of average value Generation of difference 	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire system 2 resistance-based sensors in 2-wire system for generation of average value 2 resistance thermometers in 2-wire system (R1 – R2 or R2 – R1)
Interface	
<ul style="list-style-type: none"> Two-wire system Three-wire system Four-wire system 	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance) No balancing required No balancing required
Sensor current	$\leq 0.45 \text{ mA}$

Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: OFF)
Measuring range	parameterizable max. 0 ... 2200 Ω (see table "Digital measuring errors")
Min. measured span	5 Ω ... 25 Ω (see Table "Digital measuring errors")
Characteristic curve	Resistance-linear or special characteristic
Thermocouples	
Measured variable	Temperature
Sensor type (thermocouples)	
<ul style="list-style-type: none"> Type B Type C Type D Type E Type J Type K Type L Type N Type R Type S Type T Type U 	Pt30Rh-Pt6Rh to DIN IEC 584 W5 %-Re acc. to ASTM 988 W3 %-Re acc. to ASTM 988 NiCr-CuNi to DIN IEC 584 Fe-CuNi to DIN IEC 584 NiCr-Ni to DIN IEC 584 Fe-CuNi to DIN 43710 NiCrSi-NiSi to DIN IEC 584 Pt13Rh-Pt to DIN IEC 584 Pt10Rh-Pt to DIN IEC 584 Cu-CuNi to DIN IEC 584 Cu-CuNi to DIN 43710
Units	°C or °F
Connection	
<ul style="list-style-type: none"> Standard connection Generation of average value Generation of difference 	1 thermocouple (TC) 2 thermocouples (TC) 2 thermocouples (TC) (TC1 – TC2 or TC2 – TC1)
Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Can be switched off
Cold junction compensation	
<ul style="list-style-type: none"> Internal External External fixed 	With integrated Pt100 resistance thermometer With external Pt100 IEC 60571 (2-wire or 3-wire connection) Cold junction temperature can be set as fixed value
Measuring range	Parameterizable (see table "Digital measuring errors")
Min. measured span	Min. 40 ... 100 °C (72 ... 180 °F) (see table "Digital measuring errors")
Characteristic curve	Temperature-linear or special characteristic
mV sensor	
Measured variable	DC voltage
Sensor type	DC voltage source (DC voltage source possible over an externally connected resistor)
Units	mV
Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Can be switched off
Measuring range	-10 ... +70 mV-100 ... +1100 mV

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH200 two-wire system, universal

Min. measured span	2 mV or 20 mV
Overload capability of the input	-1.5 ... +3.5 V DC
Input resistance	≥ 1 MΩ
Characteristic curve	Voltage-linear or special characteristic
Output	
Output signal	4 ... 20 mA, 2-wire
Auxiliary power	11 ... 35 V DC ((to 30 V for Ex ia and ib; to 32 V for Ex nA / nL / ic)
Max. load	(U _{aux} - 11 V)/0.023 A
Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.80 mA ... 20.5 mA)
Error signal (e.g. following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default value: 22.8 mA)
Sample cycle	0.25 s nominal
Damping	Software filter 1st order 0 ... 30 s (parameterizable)
Protection	Against reversed polarity
Electrically isolated	Input against output (1 kV _{eff})
Measuring accuracy	
Digital measuring errors	See table "Digital measuring errors"
Reference conditions	
• Auxiliary power	24 V ± 1 %
• Load	500 Ω
• Ambient temperature	23 °C
• Warming-up time	> 5 min
Error in the analog output (digital/analog converter)	< 0.025 % of span
Error due to internal cold junction	< 0.5 °C (0.9 °F)
Influence of ambient temperature	
• Analog measuring error	0.02 % of span/10°C (18 °F)
• Digital measuring errors	
- with resistance thermometers	0.06 °C (0.11 °F)/10°C (18 °F)
- with thermocouples	0.6 °C (1.1 °F)/10°C (18 °F)
Auxiliary power effect	< 0.001 % of span/V
Effect of load impedance	< 0.002 % of span/100 Ω
Long-term drift	
• In the first month	• < 0.02 % of span
• After one year	• < 0.2 % of span
• After 5 years	• < 0.3 % of span
Conditions of use	
<u>Ambient conditions</u>	
Ambient temperature range	-40 ... +85 °C (-40 ... +185 °F)
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	< 98 %, with condensation
Electromagnetic compatibility	acc. to EN 61326 and NE21
Construction	
Material	Molded plastic
Weight	50 g (0.11 lb)
Dimensions	See "Dimensional drawings"
Cross-section of cables	Max. 2.5 mm ² (AWG 13)
Degree of protection to IEC 60529	
• Enclosure	IP40
• Terminals	IP00

Certificates and approvals

Explosion protection ATEX

EC type test certificate

• "Intrinsic safety" type of protection

• "Operating equipment that is non-ignitable and has limited energy" type of protection

Explosion protection: FM for USA

• FM approval

• Degree of protection

Explosion protection to FM for Canada (cFM_{US})

• FM approval

• Degree of protection

Other certificates

Software requirements for SIPROM T

PC operating system

Factory setting:

- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

PTB 05 ATEX 2040X

II 1 G Ex ia IIC T6/T4
II 2 (1) G Ex ia/ib IIC T6/T4
II 3(1) G Ex ia/ic IIC T6/T4
II 1D Ex iaD 20 T115 °C

II 3 G Ex nL IIC T6/T4
II 3 G Ex nA IIC T6/T4

FM 3024169

IS / CI I, II, III / Div 1 / GP
ABCDEFGH T6, T5, T4
CI I / ZN 0 / AEx ia IIC T6, T5, T4
NI / CI I / Div 2 / GP ABCDFG T6, T5, T4
NI / CI I / ZN 2 / IIC T6, T5, T4

FM 3024169C

IS / CI I, II, III / Div 1 / GP
ABCDEFGH T6, T5, T4
NI / CI I / DIV 2 / GP ABCD T6, T5, T4
NIFW / CI I, II, III / DIV 2 / GP
ABCDEFGH T6, T5, T4
DIP / CI II, III / Div 2 / GP FG T6, T5, T4
CI I / ZN 0 / Ex ia IIC T6, T5, T4
CI I / ZN 2 / Ex nA nL IIC T6, T5, T4

GOST, NEPSI, PESO, IEC, EXPOLABS

Windows ME, 2000, XP, Win 7 and Win 8; can also be used in connection with RS 232 modem under Windows 95, 98 and 98SE

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH200 two-wire system, universal

Digital measuring errors

Resistance thermometer

Input	Measuring range °C / (°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
to IEC 60751					
Pt25	-200 ... +850 (-328 ... +1562)	10	(18)	0,3	(0.54)
Pt50	-200 ... +850 (-328 ... +1562)	10	(18)	0,15	(0.27)
Pt100 ... Pt200	-200 ... +850 (-328 ... +1562)	10	(18)	0,1	(0.18)
Pt500	-200 ... +850 (-328 ... +1562)	10	(18)	0,15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0,15	(0.27)
to JIS C1604-81					
Pt25	-200 ... +649 (-328 ... +1200)	10	(18)	0,3	(0.54)
Pt50	-200 ... +649 (-328 ... +1200)	10	(18)	0,15	(0.27)
Pt100 ... Pt200	-200 ... +649 (-328 ... +1200)	10	(18)	0,1	(0.18)
Pt500	-200 ... +649 (-328 ... +1200)	10	(18)	0,15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0,15	(0.27)
Ni 25 ... Ni1000	-60 ... +250 (-76 ... +482)	10	(18)	0,1	(0.18)

Resistance-based sensors

Input	Measuring range Ω	Min. mea- sured span Ω	Digital accuracy Ω
Resistance	0 ... 390	5	0,05
Resistance	0 ... 2200	25	0,25

Thermocouples

Input	Measuring range °C/(°F)	Min. mea- sured span			Digital accuracy (°F)
		°C	(°F)	°C	
Type B	0 ... 1820 (32 ... 3308)	100	(180)	2 ¹⁾	(3.60) ¹⁾
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	2	(3.60)
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.80) ²⁾
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.80)
Type J	-210 ... +1200 (-346 ... +2192)	50	(90)	1	(1.80)
Type K	-230 ... +1370 (-382 ... +2498)	50	(90)	1	(1.80)
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.80)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.80)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.60)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.60)
Type T	-200 ... +400 (-328 ... +752)	40	(72)	1	(1.80)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.60)

¹⁾ The digital accuracy in the range 0 to 300 °C (32 to 572 °F) is 3 °C (5.4 °F).

²⁾ The digital accuracy in the range 1750 to 2300 °C (3182 to 4172 °F) is 2 °C (3.6 °F).

mV sensor

Input	Measuring range mV	Min. measured span mV	Digital accuracy μV
mV sensor	-10 ... +70	2	40
mV sensor	-100 ... +1100	20	400

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0.025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH200 two-wire system, universal

Selection and Ordering data	Article No.
Temperature transmitter SITRANS TH200 for installation in connection head, type B (DIN 43729), two-wire system, 4 ... 20 mA, programmable, with electrical isolation	
<ul style="list-style-type: none"> • Without explosion protection ▶ ◆ 7NG3211-1NN00 • With explosion protection <ul style="list-style-type: none"> - to ATEX ▶ ◆ 7NG3211-1AN00 - to FM (cFM_{US}) ▶ ◆ 7NG3211-1BN00 	
Further designs	Order code
Add "-Z" to Article No. and specify Order code(s)	
With test protocol (5 measuring points)	C11
Functional safety SIL2	C20
Functional safety SIL2/3	C23
Customer-specific programming	
Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F	Y01¹⁾
Measuring point no. (TAG), max. 8 characters	Y17²⁾
Measuring point descriptor, max. 16 characters	Y23²⁾
Measuring point message, max. 32 characters	Y24²⁾
Pt100 (IEC) 2-wire, R _L = 0 Ω	U02³⁾
Pt100 (IEC) 3-wire	U03³⁾
Pt100 (IEC) 4-wire	U04³⁾
Thermocouple type B	U20³⁾⁴⁾
Thermocouple type C (W5)	U21³⁾⁴⁾
Thermocouple type D (W3)	U22³⁾⁴⁾
Thermocouple type E	U23³⁾⁴⁾
Thermocouple type J	U24³⁾⁴⁾
Thermocouple type K	U25³⁾⁴⁾
Thermocouple type L	U26³⁾⁴⁾
Thermocouple type N	U27³⁾⁴⁾
Thermocouple type R	U28³⁾⁴⁾
Thermocouple type S	U29³⁾⁴⁾
Thermocouple type T	U30³⁾⁴⁾
Thermocouple type U	U31³⁾⁴⁾
With TC: CJC external (Pt100, 3-wire)	U41
With TC: CJC external with fixed value, specify in plain text	Y50
Special differing customer-specific programming, specify in plain text	Y09⁵⁾
Fail-safe value 3.6 mA (instead of 22,8 mA)	U36²⁾
Cable extension Transmitter with installed cable extension 200 mm (7.81 inch), for Pt100 in four-wire system	W01

Accessories	Article No.
Modem for SITRANS TH100, TH200, TR200 and TF with TH200 incl. SIPROM T parameterization software ▶ With USB connection	7NG3092-8KU
MiniDVD for temperature measuring instruments ▶ With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	A5E00364512
DIN rail adapters for head transmitters ▶ (Quantity delivered: 5 units)	7NG3092-8KA
Connecting cable 4-wire, 150 mm, for sensor connections when using head transmitters in the high hinged cover (set with 5 units)	7NG3092-8KC

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

- 1) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.
- 2) For this selection, Y01 or Y09 must also be selected.
- 3) For this selection, Y01 must also be selected.
- 4) Internal cold junction compensation is selected as the default for TC.
- 5) For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Supply units see Chapter "Supplementary Components".

Ordering example 1:

7NG3211-1NN00-Z Y01+Y17+U03
 Y01: -10 ... +100 °C
 Y17: TICA123

Ordering example 2:

7NG3211-1NN00-Z Y01+Y23+U25
 Y01: -10 ... +100 °C
 Y23: TICA1234HEAT

Factory setting:

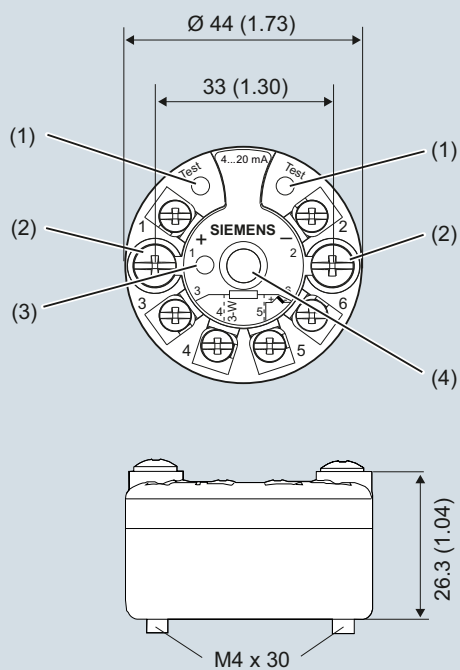
- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH200 two-wire system, universal

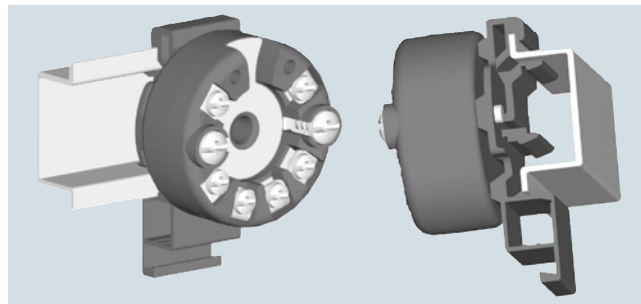
Dimensional drawings



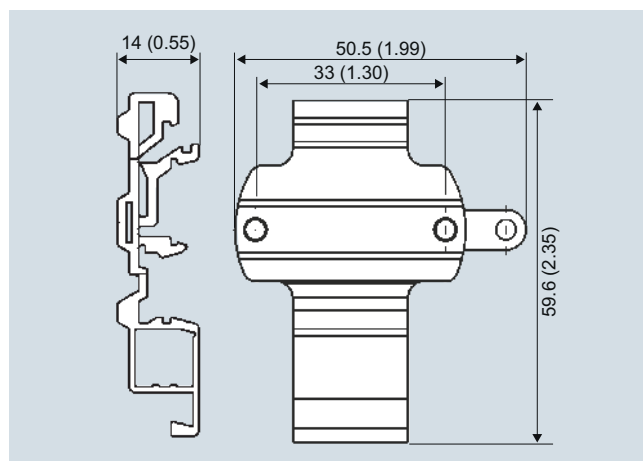
- | | | |
|-----------|----------|--|
| 1(+) | and 2(-) | Auxiliary power supply U_{aux} , output current I_{out} |
| 3, 4, 5 | and 6 | Pt100 sensor (for connections, see Sensor connection assignment) |
| Test (+), | Test (-) | Measurement of the output current with a multimeter |
| (1) | | Test terminal |
| (2) | | Mounting screw M4x30 |
| (3) | | LED for operation indication |
| (4) | | Internal diameter of center hole 6.3 (0.25) |

SITRANS TH200, dimensions and pin assignment, dimensions in mm (inch)

Mounting on DIN rail



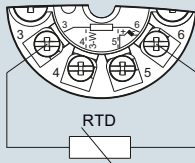
SITRANS TH200, mounting of transmitter on DIN rail



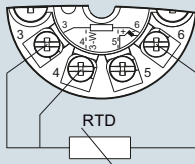
DIN rail adapter, dimensions in mm (inch)

Schematics

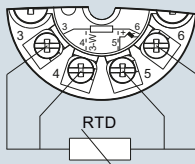
Resistance thermometer



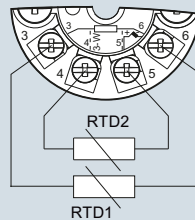
Two-wire system ¹⁾



Three-wire system



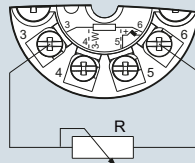
Four-wire system



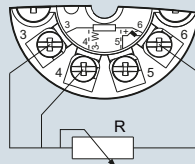
Generation of average value / difference ¹⁾

¹⁾ Programmable line resistance for the purpose of correction.

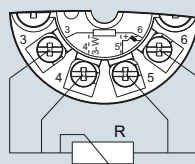
Resistance



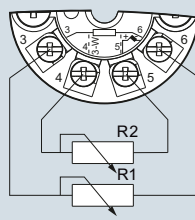
Two-wire system ¹⁾



Three-wire system

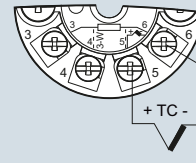


Four-wire system

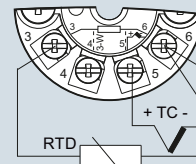


Generation of average value / difference ¹⁾

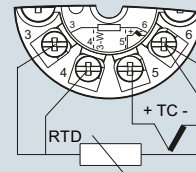
Thermocouple



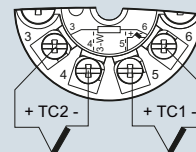
Cold junction compensation
Internal/fixed value



Cold junction compensation with
external Pt100 in two-wire system ¹⁾

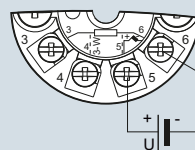


Cold junction compensation with
external Pt100 in three-wire system

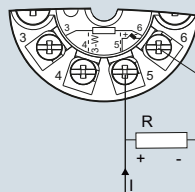


Generation of average value / difference
with internal cold junction compensation

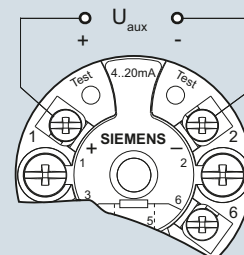
Voltage measurement



Current measurement



Connection of auxiliary power supply (U_{aux})



Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

Overview



"HART" to beat - the universal SITRANS TH300 transmitter

- Two-wire devices for 4 to 20 mA, HART
- Mounting in the connection head of the temperature sensor
- Universal input for virtually any type of temperature sensor
- Configurable over HART

Benefits

- Compact design
- Flexible mounting and center hole allow you to select your preferred type of installation
- Electrically isolated
- Test sockets for multimeters
- Diagnostics LED (green/red)
- Sensor monitoring open circuits and short-circuits
- Self-monitoring
- Configuration status stored in EEPROM
- SIL2 (with Order Code C20), SIL2/3 (with C23)
- Expanded diagnostic functions, such as slave pointer, operating hours counter, etc.
- Special characteristic
- Electromagnetic compatibility to EN 61326 and NE21

Application

SITRANS TH300 transmitters can be used in all industrial sectors. Due to their compact size they can be installed in the connection head type B (DIN 43729) or larger. The following sensors/signal sources can be connected over their universal input module:

- Resistance thermometers (2, 3 or 4-wire system)
- Thermocouples
- Resistance-based sensors and DC voltage sources

The output signal is a direct current from 4 to 20 mA in accordance with the sensor characteristic, superimposed by the digital HART signal.

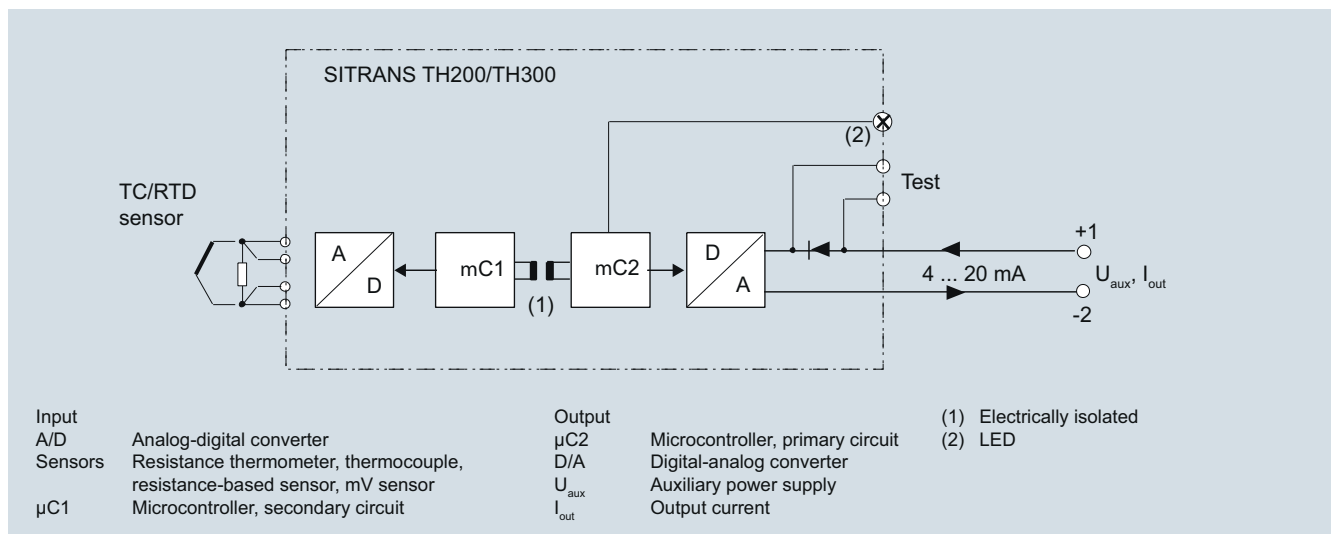
Transmitters of the "intrinsically safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX), as well as FM and CSA regulations.

Function

The SITRANS TH300 is configured over HART. This can be done using a handheld communicator or even more conveniently with a HART modem and the SIMATIC PDM parameterization software. The configuration data are then permanently stored in the non-volatile memory (EEPROM).

Once the sensors and power supply have been correctly connected, the transmitter outputs a temperature-linear output signal and the diagnostics LED displays a green light. In the case of a sensor short-circuit, the LED flashes red, an internal device fault is indicated by a steady red light.

The test socket can be used to connect an ammeter at any time for monitoring purposes and plausibility checks. The output current can be read without any interruption, or even without opening the current loop.



SITRANS TH 300 function diagram

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

Technical specifications

Input

Resistance thermometer

Measured variable	Temperature
Sensor type	
• to IEC 60751	Pt25 ... Pt1000
• To JIS C 1604; $a = 0.00392 \text{ K}^{-1}$	Pt25 ... Pt1000
• to IEC 60751	Ni25 ... Ni1000
• Special type	over special characteristic (max. 30 points)
Sensor factor	0.25 ... 10 (adaptation of the basic type, e.g. Pt100 to version Pt25 ... 1000)
Units	°C or °F
Connection	
• Standard connection	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system
• Generation of average value	2 identical resistance thermometers in 2-wire system for generation of average temperature
• Generation of difference	2 identical resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)
Interface	
• Two-wire system	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance)
• Three-wire system	No balancing required
• Four-wire system	No balancing required
Sensor current	$\leq 0.45 \text{ mA}$
Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: ON)
Measuring range	parameterizable (see table "Digital measuring errors")
Min. measured span	10 °C (18 °F)
Characteristic curve	Temperature-linear or special characteristic

Resistance-based sensors

Measured variable	Actual resistance
Sensor type	Resistance-based, potentiometers
Units	Ω
Connection	
• Normal connection	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire system
• Generation of average value	2 resistance-based sensors in 2-wire system for generation of average value
• Generation of difference	2 resistance thermometers in 2-wire system (R1 – R2 or R2 – R1)
Interface	
• Two-wire system	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance)
• Three-wire system	No balancing required
• Four-wire system	No balancing required
Sensor current	$\leq 0.45 \text{ mA}$

Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: OFF)
Measuring range	parameterizable max. 0 ... 2200 Ω (see table "Digital measuring errors")
Min. measured span	5 ... 25 Ω (see table "Digital measuring errors")
Characteristic curve	Resistance-linear or special characteristic
<u>Thermocouples</u>	
Measured variable	Temperature
Sensor type (thermocouples)	
• Type B	Pt30Rh-Pt6Rh to DIN IEC 584
• Type C	W5 %-Re acc. to ASTM 988
• Type D	W3 %-Re acc. to ASTM 988
• Type E	NiCr-CuNi to DIN IEC 584
• Type J	Fe-CuNi to DIN IEC 584
• Type K	NiCr-Ni to DIN IEC 584
• Type L	Fe-CuNi to DIN 43710
• Type N	NiCrSi-NiSi to DIN IEC 584
• Type R	Pt13Rh-Pt to DIN IEC 584
• Type S	Pt10Rh-Pt to DIN IEC 584
• Type T	Cu-CuNi to DIN IEC 584
• Type U	Cu-CuNi to DIN 43710
Units	°C or °F
Connection	
• Standard connection	1 thermocouple (TC)
• Generation of average value	2 thermocouples (TC)
• Generation of difference	2 thermocouples (TC) (TC1 – TC2 or TC2 – TC1)
Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	can be switched off
Cold junction compensation	
• Internal	With integrated Pt100 resistance thermometer
• External	With external Pt100 IEC 60571 (2-wire or 3-wire connection)
• External fixed	Cold junction temperature can be set as fixed value
Measuring range	parameterizable (see table "Digital measuring errors")
Min. measured span	Min. 40 ... 100 °C (72 ... 180 °F) (see table "Digital measuring errors")
Characteristic curve	Temperature-linear or special characteristic
<u>mV sensor</u>	
Measured variable	DC voltage
Sensor type	DC voltage source (DC voltage source possible over an externally connected resistor)
Units	mV
Response time	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Can be switched off

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

Measuring range	-10 ... +70 mV -100 ... +1100 mV
Min. measured span	2 mV or 20 mV
Overload capability of the input	-1.5 ... +3.5 V DC
Input resistance	≥ 1 MΩ
Characteristic curve	Voltage-linear or special characteristic
Output	
Output signal	4 ... 20 mA, 2-wire with communication acc. to HART Rev. 5.9
Auxiliary power	11 ... 35 V DC (to 30 V for Ex ia and ib; to 32 V for Ex nA/nL/ic)
Max. load	(U _{aux} - 11 V)/0.023 A
Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.80 mA ... 20.5 mA)
Error signal (e.g. following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default value: 22.8 mA)
Sample cycle	0.25 s nominal
Damping	Software filter 1st order 0 ... 30 s (parameterizable)
Protection	Against reversed polarity
Electrically isolated	Input against output (1 kV _{eff})
Measuring accuracy	
Digital measuring errors	See Table "Digital measuring errors"
Reference conditions	
• Auxiliary power	24 V ± 1 %
• Load	500 Ω
• Ambient temperature	23 °C
• Warming-up time	> 5 min
Error in the analog output (digital/analog converter)	< 0.025 % of span
Error due to internal cold junction	< 0.5 °C (0.9 °F)
Influence of ambient temperature	
• Analog measuring error	0.02 % of span/10°C (18 °F)
• Digital measuring errors	
- with resistance thermometers	0.06 °C (0.11 °F)/10°C (18 °F)
- with thermocouples	0.6 °C (1.1 °F)/10°C (18 °F)
Auxiliary power effect	< 0.001 % of span/V
Effect of load impedance	< 0.002 % of span/100 Ω
Long-term drift	
• In the first month	< 0.02 % of span
• After one year	< 0.2 % of span
• After 5 years	< 0.3 % of span
Conditions of use	
<u>Ambient conditions</u>	
Ambient temperature range	-40 ... +85 °C (-40 ... +185 °F)
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	< 98 %, with condensation
Electromagnetic compatibility	acc. to EN 61326 and NE21

Construction	
Material	Molded plastic
Weight	50 g (0.11 lb)
Dimensions	See "Dimensional drawings"
Cross-section of cables	Max. 2.5 mm ² (AWG 13)
Degree of protection to IEC 60529	
• Enclosure	IP40
• Terminals	IP00
Certificates and approvals	
Explosion protection ATEX	
EC type test certificate	PTB 05 ATEX 2040X
• "Intrinsic safety" type of protection	II 1 G Ex ia IIC T6/T4 II 2 (1) G Ex ia/ib IIC T6/T4 II 3(1) G Ex ia/ic IIC T6/T4 II 1D Ex iaD 20 T115 °C
• "Operating equipment that is non-ignitable and has limited energy" type of protection	II 3 G Ex nL IIC T6/T4 II 3 G Ex nA IIC T6/T4
Explosion protection: FM for USA	
• FM approval	FM 3024169
• Degree of protection	IS / CI I, II, III / Div 1 / GP ABCDEFG T6, T5, T4 CI I / ZN 0 / AEx ia IIC T6, T5, T4 NI / CI I / Div 2 / GP ABCDFG T6, T5, T4 NI / CI I / ZN 2 / IIC T6, T5, T4
Explosion protection to FM for Canada (cFM _{US})	
• FM approval	FM 3024169C
• Degree of protection	IS / CI I, II, III / Div 1 / GP ABCDEFG T6, T5, T4 NI / CI I / DIV 2 / GP ABCD T6, T5, T4 NIFW / CI I, II, III / DIV 2 / GP ABCDEFG T6, T5, T4 DIP / CI II, III / Div 2 / GP FG T6, T5, T4 CI I / ZN 0 / Ex ia IIC T6, T5, T4 CI I / ZN 2 / Ex nA nL IIC T6, T5, T4
Other certificates	GOST, NEPSI, PESO, IEC, EXPOLABS
Factory setting:	
• Pt100 (IEC 751) with 3-wire circuit	
• Measuring range: 0 ... 100 °C (32 ... 212 °F)	
• Fault current: 22.8 mA	
• Sensor offset: 0 °C (0 °F)	
• Damping 0.0 s	

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

Digital measuring errors

Resistance thermometer

Input	Measuring range °C/(°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
to IEC 60751					
Pt25	-200 ... +850 (-328 ... +1562)	10	(18)	0,3	(0.54)
Pt50	-200 ... +850 (-328 ... +1562)	10	(18)	0,15	(0.27)
Pt100 ... Pt200	-200 ... +850 (-328 ... +1562)	10	(18)	0,1	(0.18)
Pt500	-200 ... +850 (-328 ... +1562)	10	(18)	0,15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0,15	(0.27)
to JIS C1604-81					
Pt25	-200 ... +649 (-328 ... +1200)	10	(18)	0,3	(0.54)
Pt50	-200 ... +649 (-328 ... +1200)	10	(18)	0,15	(0.27)
Pt100 ... Pt200	-200 ... +649 (-328 ... +1200)	10	(18)	0,1	(0.18)
Pt500	-200 ... +649 (-328 ... +1200)	10	(18)	0,15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0,15	(0.27)
Ni 25 to Ni1000	-60 ... +250 (-76 ... +482)	10	(18)	0,1	(0.18)

Resistance-based sensors

Input	Measuring range Ω	Min. mea- sured span Ω	Digital accuracy Ω
Resistance	0 ... 2200	25	0,25

Thermocouples

Input	Measuring range °C/(°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
Type B	0 ... 1820 (32 ... 3308)	100	(180)	2 ¹⁾	(3.60) ¹⁾
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	2	(3.60)
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.80) ²⁾
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.80)
Type J	-210 ... +1200 (-346 ... +2192)	50	(90)	1	(1.80)
Type K	-230 ... +1370 (-382 ... +2498)	50	(90)	1	(1.80)
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.80)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.80)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.60)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.60)
Type T	-200 ... +400 (-328 ... +752)	40	(72)	1	(1.80)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.60)

¹⁾ The digital accuracy in the range 0 to 300 °C (32 to 572 °F) is 3 °C (5.4 °F).

²⁾ The digital accuracy in the range 1750 to 2300 (3182 to 4172 °F) is 2 °C (3.6 °F).

mV sensor

Input	Measuring range mV	Min. mea- sured span mV	Digital accuracy μV
mV sensor	-100 ... +1100	20	400

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0.025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

Selection and Ordering data	Article No.
Temperature transmitter SITRANS TH300	
for installation in connection head, type B (DIN 43729), two-wire system 4 ... 20 mA, communication capable to HART, with galvanic isolation	
• Without explosion protection ▶ ◆	7NG3212-0NN00
• With explosion protection	
- to ATEX ▶ ◆	7NG3212-0AN00
- to FM (C _{FMUS}) ▶ ◆	7NG3212-0BN00
Further designs	Order code
Add "-Z" to Article No. and specify Order code(s)	
with test protocol (5 measuring points)	C11
Functional safety SIL2	C20
Functional safety SIL2/3	C23
Customer-specific programming	
Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F	Y01¹⁾
Measuring point no. (TAG), max. 8 characters	Y17²⁾
Measuring point descriptor, max. 16 characters	Y23²⁾
Measuring point message, max. 32 characters	Y24²⁾
Pt100 (IEC) 2-wire, R _L = 0 Ω	U02³⁾
Pt100 (IEC) 3-wire	U03³⁾
Pt100 (IEC) 4-wire	U04³⁾
Thermocouple type B	U20³⁾⁴⁾
Thermocouple type C (W5)	U21³⁾⁴⁾
Thermocouple type D (W3)	U22³⁾⁴⁾
Thermocouple type E	U23³⁾⁴⁾
Thermocouple type J	U24³⁾⁴⁾
Thermocouple type K	U25³⁾⁴⁾
Thermocouple type L	U26³⁾⁴⁾
Thermocouple type N	U27³⁾⁴⁾
Thermocouple type R	U28³⁾⁴⁾
Thermocouple type S	U29³⁾⁴⁾
Thermocouple type T	U30³⁾⁴⁾
Thermocouple type U	U31³⁾⁴⁾
With TC: CJC external (Pt100, 3-wire)	U41
With TC: CJC external with fixed value, specify in plain text	Y50
Special differing customer-specific programming, specify in plain text	Y09⁵⁾
Fail-safe value 3.6 mA (instead of 22,8 mA)	U36²⁾
Cable extension Transmitter with installed cable extension 200 mm (7.87 inch), for Pt100 in four-wire system	W01

Accessories	Article No.
MiniDVD for temperature measuring instruments ▶	A5E00364512
With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	
HART modem	
• With USB connection ▶	7MF4997-1DB
SIMATIC PDM operating software	See Section 8
DIN rail adapters for head transmitters	7NG3092-8KA
(Quantity delivered: 5 units)	
Connecting cable	7NG3092-8KC
4-wire, 150 mm, for sensor connections when using head transmitters in the high hinged cover (set with 5 units)	

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

- 1) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.
- 2) For this selection, Y01 or Y09 must also be selected.
- 3) For this selection, Y01 must also be selected.
- 4) Internal cold junction compensation is selected as the default for TC.
- 5) For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Supply units see Chapter "Supplementary Components".

Ordering example 1:

7NG3212-0NN00-Z Y01+Y17+U03
Y01: -10 ... +100 °C
Y17: TICA123

Ordering example 2:

7NG3212-0NN00-Z Y01+Y23+U25
Y01: -10 ... +100 °C
Y23: TICA1234HEAT

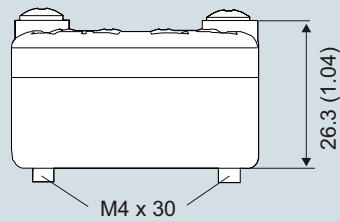
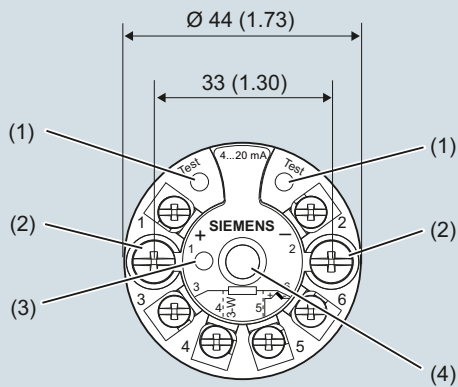
Factory setting:

- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Temperature Measurement Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

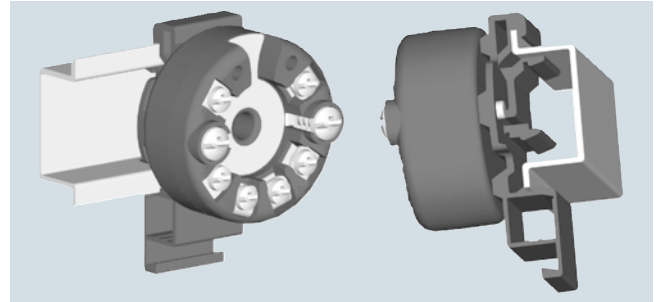
Dimensional drawings



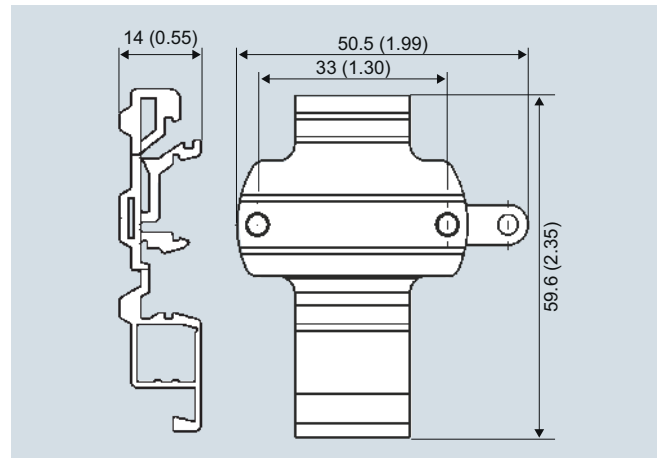
- 1(+) and 2(-) Auxiliary power supply U_{aux} , output current I_{out}
- 3, 4, 5 and 6 Pt100 sensor (for connections, see Sensor connection assignment)
- Test (+), Test (-) Measurement of the output current with a multimeter
- (1) Test terminal
- (2) Mounting screw M4x30
- (3) LED for operation indication
- (4) Internal diameter of center hole 6.3 (0.25)

SITRANS TH300, dimensions and pin assignment, dimensions in mm (inch)

Mounting on DIN rail



SITRANS TH300, mounting of transmitter on DIN rail



DIN rail adapter, dimensions in mm (inch)

Temperature Measurement

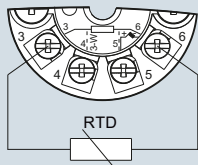
Transmitters for mounting in sensor head

SITRANS TH300 two-wire system, universal, HART

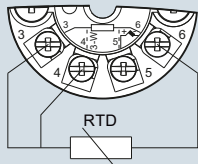
Schematics

2

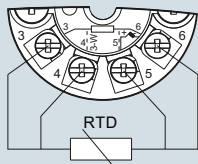
Resistance thermometer



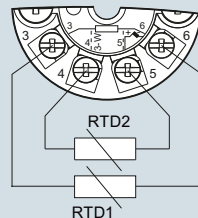
Two-wire system ¹⁾



Three-wire system



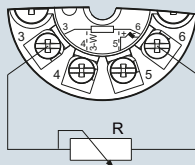
Four-wire system



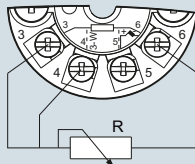
Generation of average value / difference ¹⁾

¹⁾ Programmable line resistance for the purpose of correction.

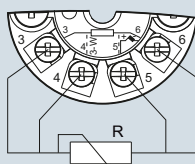
Resistance



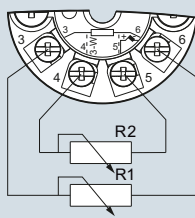
Two-wire system ¹⁾



Three-wire system

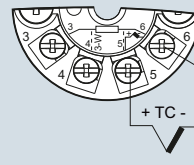


Four-wire system

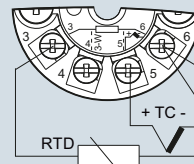


Generation of average value / difference ¹⁾

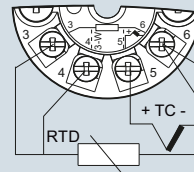
Thermocouple



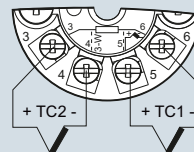
Cold junction compensation
Internal/fixed value



Cold junction compensation with
external Pt100 in two-wire system ¹⁾

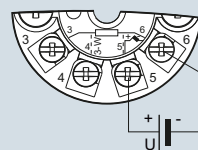


Cold junction compensation with
external Pt100 in three-wire system

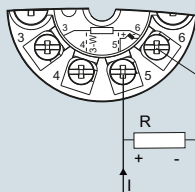


Generation of average value / difference
with internal cold junction compensation

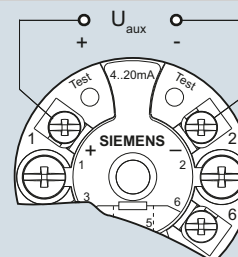
Voltage measurement



Current measurement



Connection of auxiliary power supply (U_{aux})



SITRANS TH300, sensor connection assignment

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH400 fieldbus transmitter

Overview



SITRANS TH400 fieldbus transmitters

Versions:

- For FOUNDATION fieldbus
- For PROFIBUS PA

The SITRANS TH400 temperature transmitter is a small field bus transmitter for mounting in the connection head of form B. Extensive functionality enables the temperature transmitter to be precisely adapted to the plant's requirements. Operation is very simple in spite of the numerous setting options. Thanks to its universal concept it can be used in all industries and is easy to integrate in the context of Totally Integrated Automation applications.

Transmitters of the "intrinsically safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX), as well as FM and CSA regulations.

Installing SITRANS TH400 in temperature sensors turns them into complete, bus-capable measuring points; compact - and in a single device.

Application

- Linearized temperature measurement with resistance thermometers or thermal elements
- Differential, mean-value or redundant temperature measurement with resistance thermometers or thermal elements
- Linear resistance and bipolar millivolt measurements
- Differential, mean-value or redundant resistance and bipolar millivolt measurements

Function

Features

- Mounting in connection head, type B, to DIN 43729, or larger
- Polarity-neutral bus connection
- 24-bit analog-digital converter for high resolution
- Electrically isolated
- Intrinsically-safe version for use in potentially explosive areas
- Special characteristic
- Sensor redundancy

With PROFIBUS PA communication

- Function blocks: 2 x analog

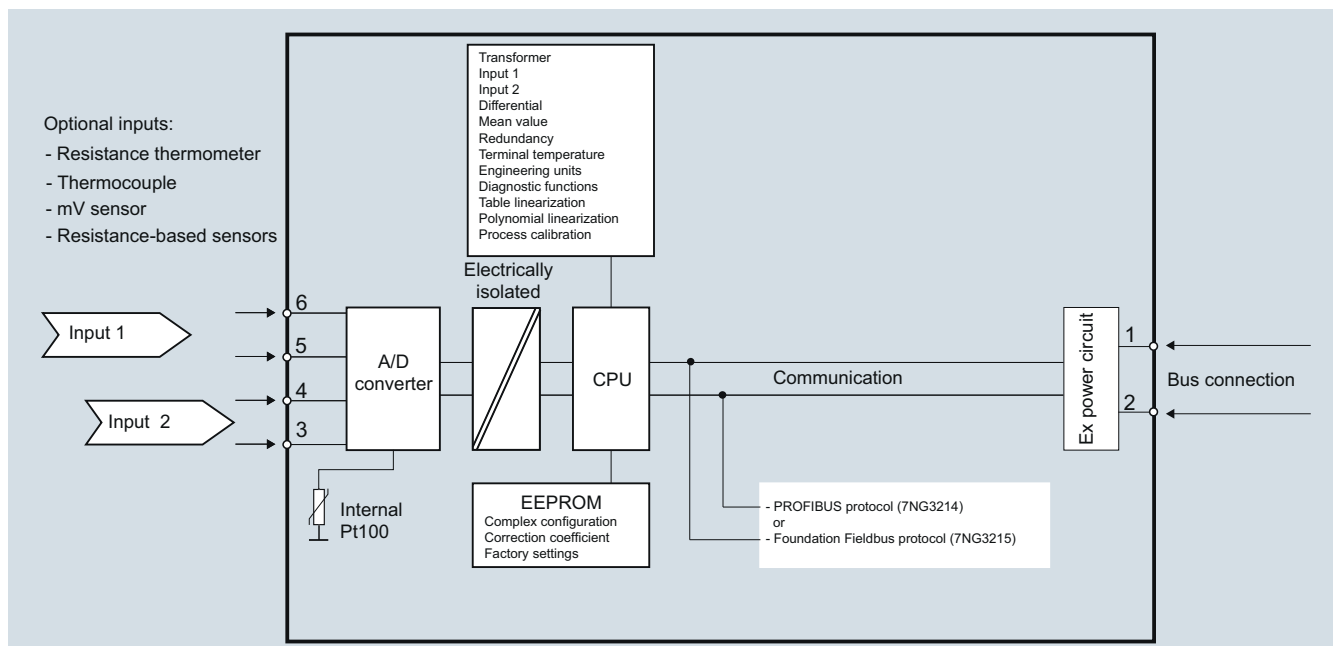
With FOUNDATION fieldbus communication

- Function blocks: 2 x analog and 1 x PID
- Functionality: Basic or LAS

Mode of operation

The following function diagram explains the mode of operation of the transmitter.

The only difference between the two versions of the SITRANS TH400 (7NG3214-... and 7NG3215-...) is the type of fieldbus protocol used (PROFIBUS PA or FOUNDATION fieldbus).



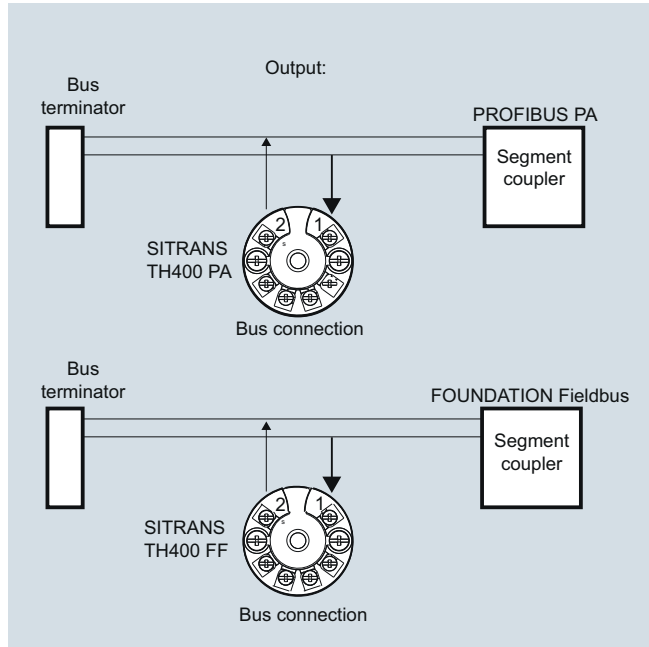
SITRANS TH400, function diagram

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH400 fieldbus transmitter

System communication



SITRANS TH400, communication interface

Technical specifications

Input

Analog-to-digital conversion

- Measurement rate < 50 ms
- Resolution 24-bit

Resistance thermometer

Pt25 ... Pt1000 to IEC 60751/JIS C 1604

- Measuring range -200 ... +850 °C (-328 ... +1562 °F)

Ni25 ... Ni1000 to DIN 43760

- Measuring range -60 ... +250 °C (-76 ... +482 °F)

Cu10 ... Cu1000, $\alpha = 0.00427$

- Measuring range -50 ... +200 °C (-58 ... +392 °F)

Line resistance per sensor cable

Max. 50 Ω

Sensor current

Nominal 0.2 mA

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 15 Ω

Resistance-based sensors

Measuring range 0 Ω ... 10 k Ω

Line resistance per sensor cable

Max. 50 Ω

Sensor current

Nominal 0.2 mA

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 15 Ω

Thermocouple

to IEC 584

- Type B
- Type E
- Type J
- Type K
- Type N
- Type R
- Type S
- Type T

to DIN 43710

- Type L
- Type U

to ASTM E988-90

- Type W3 0 ... 2300 °C (32 ... +4172 °F)
- Type W5 0 ... 2300 °C (32 ... +4172 °F)

External cold junction compensation -40 ... +135 °C (-40 ... +275 °F)

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 3 mV
- Sensor current in the event of open-circuit monitoring 4 μ A

mV sensor - voltage input

Measuring range -800 ... +800 mV

Input resistance 10 M Ω

Output

Filter time (programmable) 0 ... 60 s

Update time < 400 ms

Measuring accuracy

Accuracy is defined as the higher value of general values and basic values.

General values

Type of input

All

Absolute accuracy

$\leq \pm 0.05$ % of the measured value

Temperature coefficient

$\leq \pm 0.002$ % of the measured value/°C

Basic values

Type of input

Pt100 and Pt1000

Basic accuracy

$\leq \pm 0.1$ °C

Temperature coefficient

$\leq \pm 0.002$ °C/°C

Ni100

$\leq \pm 0.15$ °C

$\leq \pm 0.002$ °C/°C

Cu10

$\leq \pm 1.3$ °C

$\leq \pm 0.02$ °C/°C

Resistance-based sensors

$\leq \pm 0.05$ Ω

$\leq \pm 0.002$ Ω /°C

Voltage source

$\leq \pm 10$ μ V

$\leq \pm 0.2$ % μ V/°C

Thermocouple, type: E, J, K, L, N, T, U

$\leq \pm 0.5$ °C

$\leq \pm 0.01$ °C/°C

Thermocouple, type: B, R, S, W3, W5

$\leq \pm 1$ °C

$\leq \pm 0.025$ °C/°C

Cold junction compensation

$\leq \pm 0.5$ °C

Reference conditions

Warming-up time

30 s

Signal-to-noise ratio

Min. 60 dB

Calibration condition

20 ... 28 °C (68 ... 82 °F)

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH400 fieldbus transmitter

Conditions of use <u>Ambient conditions</u> Permissible ambient temperature -40 ... +85 °C (-40 ... +185 °F) Permissible storage temperature -40 ... +85 °C (-40 ... +185 °F) Relative humidity ≤ 98 %, with condensation Insulation resistance • Test voltage 500 V AC for 60 s Mechanical testing • Vibrations (DIN class B) to IEC 60068-2-6 and IEC 60068-2-64 4 g/2 ... 100 Hz <u>Electromagnetic compatibility</u> EMC noise voltage influence < ± 0.1 % of span Extended EMC noise immunity: NAMUR NE 21, criterion A, Burst < ± 1 % of span EMC 2004/108/EC Emission and Noise Immunity to EN 61326		Certificates and approvals Explosion protection ATEX EC type test certificate • "Intrinsic safety" type of protection EC type test certificate • Type of protection for "equipment is non-arcing" Explosion protection: FM for USA • FM approval • Degree of protection Explosion protection CSA for Canada • CSA approval • Degree of protection Other certificates Communication Parameterization interface • PROFIBUS PA connection - Protocol Profile 3.0 - Address (for delivery) 126 • FOUNDATION fieldbus connection - Protocol FF protocol - Functionality Basic or LAS - Version ITK 4.6 - Function blocks 2 x analog and 1 x PID
Construction Material Molded plastic Weight 55 g (0.12 lb) Dimensions See Dimensional drawings Cross-section of cables Max. 2.5 mm ² (AWG 13) Degree of protection • Transmitter enclosure IP40 • Terminal IP00		KEMA 06 ATEX 0264 II 1 G Ex ia IIC T4...T6 II 2(1) G Ex ib[ia] IIC T4...T6 II 1 D Ex iaD KEMA 06 ATEX 0263 X II 3 GD Ex nA[nL] IIC T4...T6 II 3 GD Ex nL IIC T4...T6 II 3 GD Ex nA[ic] IIC T4...T6 II 3 GD Ex ic IIC T4...T6 FM 3027985 • IS Class I, Div 1, Groups A, B, C, D T4/T5/T6, FISCO • IS Class I, Zone 0, AEx ia, IIC T4/T5/T6, FISCO • NI Class I, Div 2, Groups A, B, C, D T4/T5/T6, FNIC0 CSA 1861385 • IS Class I, Div 1, Groups A, B, C, D T4/T5/T6 • Ex ia IIC T4/T5/T6 and Ex ib [ia] IIC T4/T5/T6 • NI Class I, Div 2, Groups A, B, C, D T4/T5/T6 • Ex nA II T4/T5/T6 GOST, PESO
Auxiliary power Power supply • Standard, Ex "nA", Ex "nL", NI 9.0 ... 32 V DC • ATEX, FM, UL and CSA 9.0 ... 30 V DC • In FISCO/FNICO installations 9.0 ... 17.5 V DC Power consumption < 11 mA Max. increase in power consumption in the event of a fault < 7 mA		Factory setting <u>only for SITRANS TH400 PA</u> Sensor Pt100 (IEC) Type of connection 3-wire circuit Unit °C Failure mode Last valid value Filter time 0 s PA address 126 PROFIBUS Ident No. Manufacturer-specific <u>only for SITRANS TH400 FF</u> Sensor Pt100 (IEC) Type of connection 3-wire circuit Unit °C Failure mode Last valid value Filter time 0 s Node address 22

Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH400 fieldbus transmitter

Selection and Ordering data	Article No.
Temperature transmitter SITRANS TH400 for installation in connection head, with electrical isolation, order operating instructions separately.	
<ul style="list-style-type: none"> Bus-compatible to PROFIBUS PA <ul style="list-style-type: none"> No explosion protection or Zone 2/Div 2 to ATEX/FM/CSA/IECEX/NEPSI ▶ ◆ 7NG3214-0NN00 With explosion protection "Intrinsically safe to ATEX/FM/CSA/IECEX/NEPSI" ▶ ◆ 7NG3214-0AN00 Bus-compatible to FOUNDATION Fieldbus <ul style="list-style-type: none"> No explosion protection or Zone 2/Div 2 to ATEX/FM/CSA/IECEX/NEPSI ▶ ◆ 7NG3215-0NN00 With explosion protection "Intrinsically safe to ATEX/FM/CSA/IECEX/NEPSI" ▶ ◆ 7NG3215-0AN00 	
Further designs Please add "-Z" to Article No. and specify Order code(s) and plain text.	Order code
With test protocol (5 measuring points)	C11¹⁾
Customer-specific programming Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F	Y01¹⁾
Measuring point no. (TAG), max. 32 characters	Y17²⁾
Measuring point descriptor, max. 32 characters	Y23²⁾
Measuring point message, max. 32 characters	Y24²⁾
Bus address, specify in plain text	Y25²⁾
Pt100 (IEC) 2-wire, $R_L = 0 \Omega$	U02³⁾
Pt100 (IEC) 3-wire	U03³⁾
Pt100 (IEC) 4-wire	U04³⁾
Thermocouple type B	U20³⁾⁴⁾
Thermocouple type C (W5)	U21³⁾⁴⁾
Thermocouple type D (W3)	U22³⁾⁴⁾
Thermocouple type E	U23³⁾⁴⁾
Thermocouple type J	U24³⁾⁴⁾
Thermocouple type K	U25³⁾⁴⁾
Thermocouple type L	U26³⁾⁴⁾
Thermocouple type N	U27³⁾⁴⁾
Thermocouple type R	U28³⁾⁴⁾
Thermocouple type S	U29³⁾⁴⁾
Thermocouple type T	U30³⁾⁴⁾
Thermocouple type U	U31³⁾⁴⁾
With TC: CJC external (Pt100, 3-wire)	U41
With TC: CJC external with fixed value, specify in plain text	Y50
Special differing customer-specific programming, specify in plain text	Y09⁵⁾

Accessories	Article No.
MiniDVD for temperature measuring instruments ▶	A5E00364512
With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	
SIMATIC PDM operating software	See Chapter 8
DIN rail adapters for head transmitters (Quantity delivered: 5 units)	7NG3092-8KA
Connecting cable 4-wire, 150 mm, for sensor connections when using head transmitters in the high hinged cover (set with 5 units)	7NG3092-8KC
for additional PA components	See Catalog IK PI

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

- For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.
- For this selection, Y01 or Y09 must also be selected.
- For this selection, Y01 must also be selected.
- Internal cold junction compensation is selected as the default for TC.
- For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Ordering example 1:

7NG3214-0NN00-Z Y01+Y17+U03
 Y01: 0...100 °C
 Y17: TICA1234HEAT

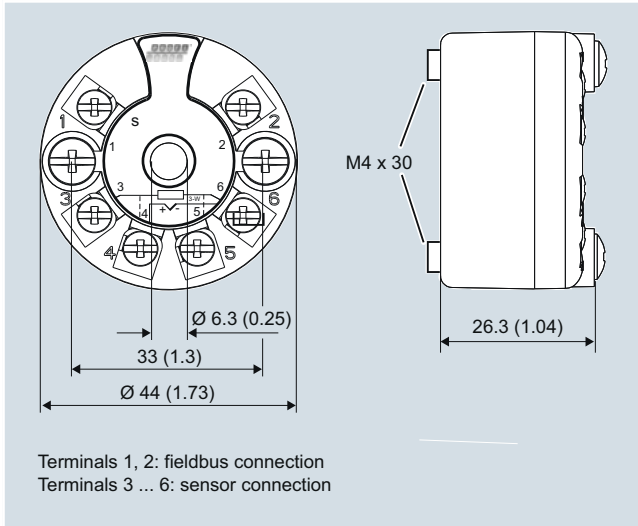
Ordering example 2:

7NG3214-0NN00-Z Y01+Y17+Y25+U25
 Y01: 0...500 °C
 Y17: TICA5678HEAT
 Y25: 33

Factory setting:

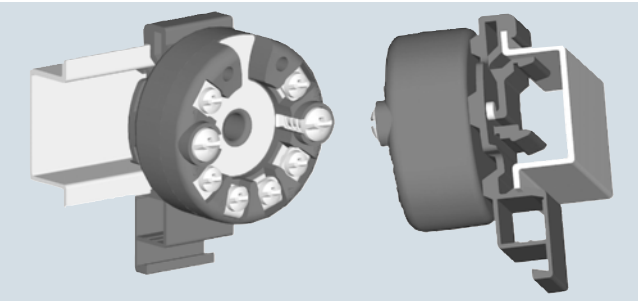
- For SITRANS TH400 PA:
 - Pt100 (IEC 751) with 3-wire circuit
 - Unit: °C
 - Failure mode: Last valid value
 - Filter time: 0 s
 - PA address: 126
 - PROFIBUS Ident No.: Manufacturer-specific
- For SITRANS TH400 FF:
 - Pt100 (IEC 751) with 3-wire circuit
 - Unit: °C
 - Failure mode: Last valid value
 - Filter time: 0 s
 - Node address: 22

Dimensional drawings

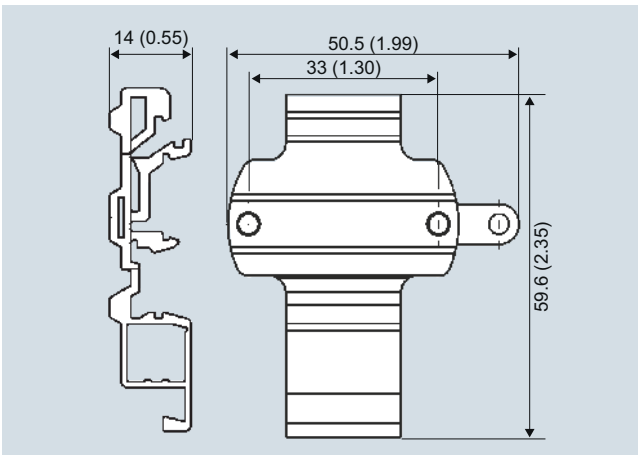


SITRANS TH400 dimensions in mm (inches) and connections

Mounting on DIN rail



SITRANS TH400, mounting of transmitter on DIN rail



DIN rail adaptor, dimensions in mm (inch)

Temperature Measurement

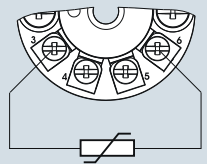
Transmitters for mounting in sensor head

SITRANS TH400 fieldbus transmitter

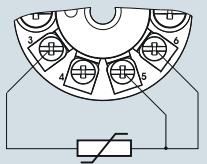
Schematics

2

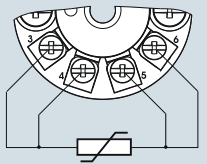
Resistance thermometer



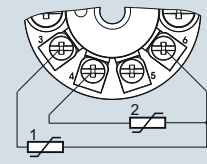
Two-wire system ¹⁾



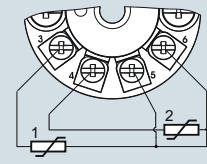
Three-wire system



Four-wire system



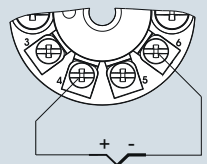
Mean-value/differential or redundancy generation 2 x two-wire system ¹⁾



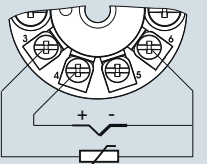
Mean-value/differential or redundancy generation 1 sensor in two-wire system ¹⁾ 1 sensor in three-wire system

¹⁾ Programmable line resistance for the purpose of correction.

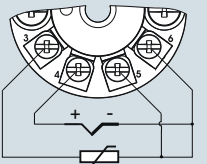
Thermocouple



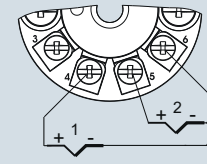
Internal cold junction compensation



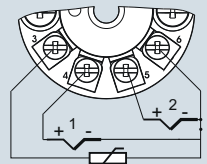
Cold junction compensation with external Pt100 in two-wire system ¹⁾



Cold junction compensation with external Pt100 in three-wire system

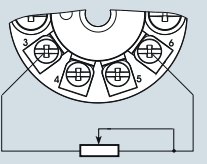


Mean value, differential or redundancy generation with internal cold junction compensation

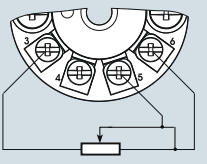


Mean value, differential or redundancy generation and cold junction compensation with internal Pt100 in two-wire system ¹⁾

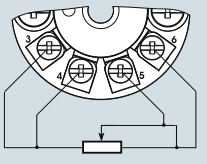
Resistance



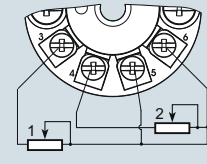
Two-wire system ¹⁾



Three-wire system

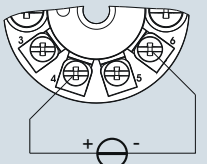


Four-wire system

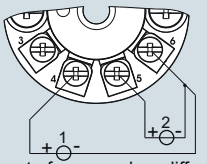


Mean value, differential or redundancy generation 1 resistor in two-wire system ¹⁾ 1 resistor in three-wire system

Voltage measurement



One voltage source



Measurement of mean value, differential and redundancy with 2 voltage sources

SITRANS TH400, sensor connection assignment

Overview



Ultra flexible - with the universal SITRANS TR200 transmitter

- Two-wire devices for 4 to 20 mA
- Enclosure for rail mounting
- Universal input for virtually any type of temperature sensor
- Configurable over PC

Benefits

- Compact design
- Electrically isolated
- Test sockets for multimeters
- Diagnostics LED (green/red)
- Sensor monitoring open circuits and short-circuits
- Self-monitoring
- Configuration status stored in EEPROM
- Expanded diagnostic functions, such as slave pointer, operating hours counter, etc.
- Special characteristic
- Electromagnetic compatibility to EN 61326 and NE21
- SIL2 (with Order Code C20), SIL2/3 (with C23)

Application

SITRANS TR200 transmitters can be used in all industrial sectors. Their compact design enables simple mounting on standard DIN rails on-site in protective boxes or in control cabinets. The following sensors/signal sources can be connected over their universal input module:

- Resistance thermometers (2, 3 or 4-wire system)
- Thermocouples
- Resistance-based sensors and DC voltage sources

The output signal is a direct current from 4 to 20 mA in accordance with the sensor characteristic.

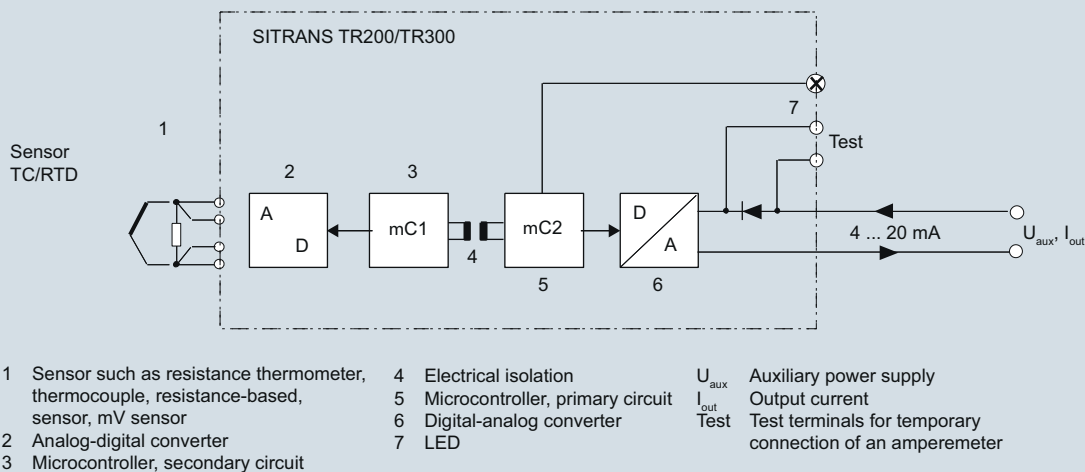
Transmitters of the "intrinsically safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX).

Function

The SITRANS TR200 is configured over a PC. A USB or RS 232 modem is linked to the output terminals for this purpose. The configuration data can now be edited using the SIPROM T software tool. The configuration data are then permanently stored in the non-volatile memory (EEPROM).

Once the sensors and power supply have been correctly connected, the transmitter outputs a temperature-linear output signal and the diagnostics LED displays a green light. In the case of a sensor short-circuit, the LED flashes red, an internal device fault is indicated by a steady red light.

The test socket can be used to connect an ammeter at any time for monitoring purposes and plausibility checks. The output current can be read without any interruption, or even without opening the current loop.



SITRANS TR200 function diagram

Temperature Measurement

Transmitters for rail mounting

SITRANS TR200 two-wire system, universal

Technical specifications

Input		Short-circuit monitoring	
<u>Resistance thermometer</u>		can be switched on/off (default value: OFF)	
Measured variable	Temperature	Measuring range	parameterizable max. 0 ... 2200 Ω (see table "Digital measuring errors")
Sensor type		Min. measured span	5 ... 25 Ω (see table "Digital measuring errors")
• to IEC 60751	Pt25 ... 1000	Characteristic curve	Resistance-linear or special characteristic
• to JIS C 1604; a=0.00392 K ⁻¹	Pt25 ... 1000	<u>Thermocouples</u>	
• to IEC 60751	Ni25 ... 1000	Measured variable	Temperature
• Special type	over special characteristic (max. 30 points)	Sensor type (thermocouples)	
Sensor factor	0.25 ... 10 (adaptation of the basic type, e.g. Pt100 to version Pt25 ... 1000)	• Type B	Pt30Rh-Pt6Rh to DIN IEC 584
Units	°C or °F	• Type C	W5 %-Re acc. to ASTM 988
Connection		• Type D	W3 %-Re acc. to ASTM 988
• Standard connection	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system	• Type E	NiCr-CuNi to DIN IEC 584
• Generation of average value	2 resistance thermometers in 2-wire system for generation of average temperature	• Type J	Fe-CuNi to DIN IEC 584
• Generation of difference	2 resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)	• Type K	NiCr-Ni to DIN IEC 584
Interface		• Type L	Fe-CuNi to DIN 43710
• Two-wire system	Parameterizable line resistance ≤ 100 Ω (loop resistance)	• Type N	NiCrSi-NiSi to DIN IEC 584
• Three-wire system	No balancing required	• Type R	Pt13Rh-Pt to DIN IEC 584
• Four-wire system	No balancing required	• Type S	Pt10Rh-Pt to DIN IEC 584
Sensor current	≤ 0.45 mA	• Type T	Cu-CuNi to DIN IEC 584
Response time T ₆₃	≤ 250 ms for 1 sensor with open-circuit monitoring	• Type U	Cu-CuNi to DIN 43710
Open-circuit monitoring	Always active (cannot be disabled)	Units	°C or °F
Short-circuit monitoring	can be switched on/off (default value: ON)	Connection	
Measuring range	parameterizable (see table "Digital measuring errors")	• Standard connection	1 thermocouple (TC)
Min. measured span	10 °C (18 °F)	• Generation of average value	2 thermocouples (TC)
Characteristic curve	Temperature-linear or special characteristic	• Generation of difference	2 thermocouples (TC) (TC1 – TC2 or TC2 – TC1)
<u>Resistance-based sensors</u>		Response time T ₆₃	≤ 250 ms for 1 sensor with open-circuit monitoring
Measured variable	Actual resistance	Open-circuit monitoring	Can be switched off
Sensor type	Resistance-based, potentiometers	Cold junction compensation	
Units	Ω	• Internal	With integrated Pt100 resistance thermometer
Connection		• External	With external Pt100 IEC 60571 (2-wire or 3-wire connection)
• Normal connection	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire system	• External fixed	Cold junction temperature can be set as fixed value
• Generation of average value	2 resistance-based sensors in 2-wire system for generation of average value	Measuring range	parameterizable (see table "Digital measuring errors")
• Generation of difference	2 resistance thermometers in 2-wire system (R1 – R2 or R2 – R1)	Min. measured span	Min. 40 ... 100 °C (72 ... 180 °F) (see table "Digital measuring errors")
Interface		Characteristic curve	Temperature-linear or special characteristic
• Two-wire system	Parameterizable line resistance ≤ 100 Ω (loop resistance)	<u>mV sensor</u>	
• Three-wire system	No balancing required	Measured variable	DC voltage
• Four-wire system	No balancing required	Sensor type	DC voltage source (DC voltage source possible over an externally connected resistor)
Sensor current	≤ 0.45 mA	Units	mV
Response time T ₆₃	≤ 250 ms for 1 sensor with open-circuit monitoring	Response time T ₆₃	≤ 250 ms for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)	Open-circuit monitoring	Can be switched off
		Measuring range	parameterizable max. - 100 ... 1100 mV
		Min. measured span	2 mV or 20 mV
		Overload capability of the input	-1.5 ... +3.5 V DC
		Input resistance	≥ 1 MΩ
		Characteristic curve	Voltage-linear or special characteristic

Output	
Output signal	4 ... 20 mA, 2-wire
Auxiliary power	11 ... 35 V DC (to 30 V for Ex i/ic; to 32 V for Ex nA)
Max. load	$(U_{aux} - 11 \text{ V})/0.023 \text{ A}$
Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.84 mA ... 20.5 mA)
Error signal (e.g. following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default value: 22.8 mA)
Sample cycle	0.25 s nominal
Damping	Software filter 1st order 0 ... 30 s (parameterizable)
Protection	Against reversed polarity
Electrically isolated	Input against output 2.12 kV DC (1.5 kV _{eff} AC)

Measuring accuracy	
Digital measuring errors	See Table "Digital measuring errors"
Reference conditions	
• Auxiliary power	24 V ± 1 %
• Load	500 Ω
• Ambient temperature	23 °C
• Warming-up time	> 5 min
Error in the analog output (digital/analog converter)	< 0.025 % of span
Error due to internal cold junction	< 0.5 °C (0.9 °F)
Influence of ambient temperature	
• Analog measuring error	0.02 % of span/10 °C (18 °F)
• Digital measuring errors	
- With resistance thermometer	0.06 °C (0.11 °F)/10 °C (18 °F)
- with thermocouples	0.6 °C (1.1 °F)/10 °C (18 °F)
Auxiliary power effect	< 0.001 % of span/V
Effect of load impedance	< 0.002 % of span/100 Ω
Long-term drift	
• In the first month	< 0.02 % of span in the first month
• After one year	< 0.2 % of span after one year
• After 5 years	< 0.3 % of span after 5 years

Conditions of use	
<u>Ambient conditions</u>	
Ambient temperature range	-40 ... +85 °C (-40 ... +185 °F)
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	< 98 %, with condensation
Electromagnetic compatibility	acc. to EN 61326 and NE21

Construction	
Material	Plastic, electronic module potted
Weight	122 g
Dimensions	See "Dimensional drawings"
Cross-section of cables	Max. 2.5 mm ² (AWG 13)
Degree of protection to IEC 60529	
• Enclosure	IP20

Certificates and approvals	
Explosion protection ATEX	
EC type test certificate	PTB 07 ATEX 2032X
• "Intrinsic safety" type of protection	II 2(1) G Ex ia/ib IIC T6/T4 II 3(1) G Ex ia/ic IIC T6/T4 II 3 G Ex ic IIC T6/T4 II 2(1) D Ex iaD/ibD 20/21 T115 °C
• Type of protection, "equipment is non-arcing"	II 3 G Ex nA IIC T6/T4
Other certificates	NEPSI
Software requirements for SIPROM T	
PC operating system	Windows ME, 2000, XP, Win 7 and Win 8; can also be used in connection with RS 232 modem under Windows 95, 98 and 98SE

Factory setting:

- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Error signal in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Digital measuring errors

Resistance thermometer

Input	Measuring range °C/(°F)	Min. measured span		Digital accuracy	
		°C	(°F)	°C	(°F)
to IEC 60751					
Pt25	-200 ... +850 (-328 ... +1562)	10	(18)	0.3	(0.54)
Pt50	-200 ... +850 (-328 ... +1562)	10	(18)	0.15	(0.27)
Pt100 ... Pt200	-200 ... +850 (-328 ... +1562)	10	(18)	0.1	(0.18)
Pt500	-200 ... +850 (-328 ... +1562)	10	(18)	0.15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0.15	(0.27)
to JIS C1604-81					
Pt25	-200 ... +649 (-328 ... +1200)	10	(18)	0.3	(0.54)
Pt50	-200 ... +649 (-328 ... +1200)	10	(18)	0.15	(0.27)
Pt100 ... Pt200	-200 ... +649 (-328 ... +1200)	10	(18)	0.1	(0.18)
Pt500	-200 ... +649 (-328 ... +1200)	10	(18)	0.15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0.15	(0.27)
Ni 25 to Ni1000	-60 ... +250 (-76 ... +482)	10	(18)	0.1	(0.18)

Temperature Measurement

Transmitters for rail mounting

SITRANS TR200 two-wire system, universal

Resistance-based sensors

Input	Measuring range	Min. mea- sured span	Digital accuracy
	Ω	Ω	Ω
Resistance	0 ... 390	5	0.05
Resistance	0 ... 2200	25	0.25

Thermocouples

Input	Measuring range	Min. mea- sured span		Digital accuracy	
		$^{\circ}\text{C}$	$(^{\circ}\text{F})$	$^{\circ}\text{C}$	$(^{\circ}\text{F})$
Type B	0 ... 1820 (32 ... 3308)	100	(180)	2 ¹⁾	(3.6) ¹⁾
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	2	(3.6)
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.8) ²⁾
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.8)
Type J	-210 ... +1200 (-346 ... +2192)	50	(90)	1	(1.8)
Type K	-230 ... +1370 (-382 ... +2498)	50	(90)	1	(1.8)
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.8)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.8)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type T	-200 ... +400 (-328 ... +752)	40	(72)	1	(1.8)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.6)

¹⁾ The digital accuracy in the range 0 to 300 °C (32 to 572 °F) is 3 °C (5.4 °F).

²⁾ The digital accuracy in the range 1750 to 2300 °C (3182 to 4172 °F) is 2 °C (3.6 °F).

mV sensor

Input	Measuring range	Min. measured span	Digital accuracy
	mV	mV	μV
mV sensor	-10 ... +70	2	40
mV sensor	-100 ... +1100	20	400

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0.025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Temperature Measurement Transmitters for rail mounting

SITRANS TR200 two-wire system, universal

Selection and Ordering data	Article No.
Temperature transmitter SITRANS TR200	
For mounting on a standard DIN rail, two-wire system, 4 to 20 mA, programmable, with electrical isolation, with documentation on MiniDVD	
<ul style="list-style-type: none"> Without explosion protection ▶ ◆ 7NG3032-0JN00 With explosion protection to ATEX ▶ ◆ 7NG3032-1JN00 	
Further designs	Order code
Please add "-Z" to Article No. with and specify Order codes(s).	
With test protocol (5 measuring points)	C11
Functional safety SIL2	C20
Functional safety SIL2/3	C23
Customer-specific programming	
Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F	Y01¹⁾
Measuring point no. (TAG), max. 8 characters	Y17²⁾
Measuring point descriptor, max. 16 characters	Y23²⁾
Measuring point message, max. 32 characters	Y24²⁾
Text on front label, max. 16 characters	Y29²⁾³⁾
Pt100 (IEC) 2-wire, $R_L = 0 \Omega$	U02⁴⁾
Pt100 (IEC) 3-wire	U03⁴⁾
Pt100 (IEC) 4-wire	U04⁴⁾
Thermocouple type B	U20⁴⁾⁵⁾
Thermocouple type C (W5)	U21⁴⁾⁵⁾
Thermocouple type D (W3)	U22⁴⁾⁵⁾
Thermocouple type E	U23⁴⁾⁵⁾
Thermocouple type J	U24⁴⁾⁵⁾
Thermocouple type K	U25⁴⁾⁵⁾
Thermocouple type L	U26⁴⁾⁵⁾
Thermocouple type N	U27⁴⁾⁵⁾
Thermocouple type R	U28⁴⁾⁵⁾
Thermocouple type S	U29⁴⁾⁵⁾
Thermocouple type T	U30⁴⁾⁵⁾
Thermocouple type U	U31⁴⁾⁵⁾
With TC: CJC external (Pt100, 3-wire)	U41
With TC: CJC external with fixed value, specify in plain text	Y50
Special differing customer-specific programming, specify in plain text	Y09⁶⁾
Fail-safe value 3.6 mA (instead of 22.8 mA)	U36²⁾

Accessories	Article No.
Modem for SITRANS TH100, TH200, TR200 and TF with TH200 incl. SIPROM T parameterization software With USB connection	7NG3092-8KU
MiniDVD for temperature measuring instruments for	A5E00364512
With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

- For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.
- For this selection, Y01 or Y09 must also be selected.
- Text on front plate is not saved in the device.
- For this selection, Y01 must also be selected.
- Internal cold junction compensation is selected as the default for TC.
- For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Supply units see Chapter "Supplementary Components".

Ordering example 1:

7NG3032-0JN00-Z Y01+Y17+Y29+U03
Y01: -10 ... +100 °C
Y17: TICA123
Y29: TICA123

Ordering example 2:

7NG3032-0JN00-Z Y01+Y17+Y23+Y29+U25
Y01: -10 ... +100 °C
Y17: TICA123
Y23: TICA123HEAT
Y29: TICA123HEAT

Factory setting:

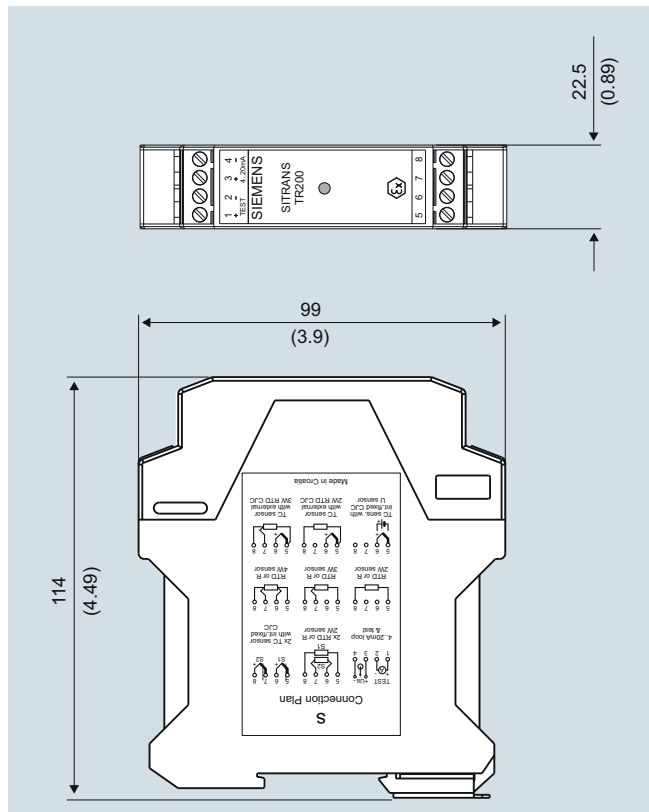
- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Temperature Measurement

Transmitters for rail mounting

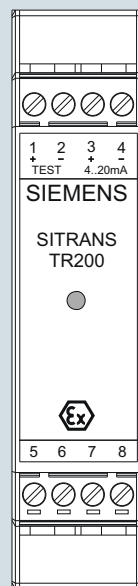
SITRANS TR200 two-wire system, universal

Dimensional drawings



SITRANS TR200, dimensions in mm (inch)

Schematics

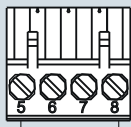


Assignments

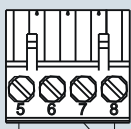
- 1 (+) and 2 (-) Test terminals (test) for measurement of the output current with a multimeter
- 3 (+) and 4 (-) Power supply U_{aux} , output current I_{out}
- 5, 6, 7 and 8 Sensor assignment, see schematics

SITRANS TR200, pin assignment

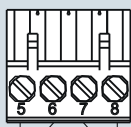
Resistance thermometer



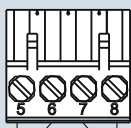
Two-wire system ¹⁾



Three-wire system



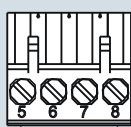
Four-wire system



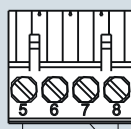
Generation of average value/difference ¹⁾

¹⁾ Programmable line resistance for the purpose of correction.

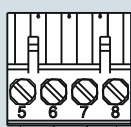
Resistance



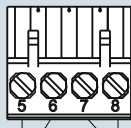
Two-wire system ¹⁾



Three-wire system

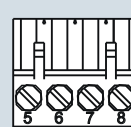


Four-wire system

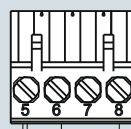


Generation of average value/difference ¹⁾

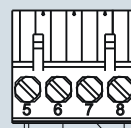
Thermocouple



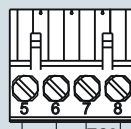
Cold junction compensation internal/fixed value



Cold junction compensation with external Pt100 in two-wire system ¹⁾

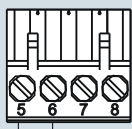


Cold junction compensation with external Pt100 in three-wire system

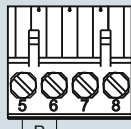


Generation of average value / difference with internal cold junction compensation

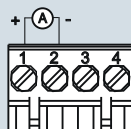
Voltage measurement



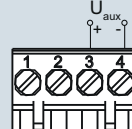
Current measurement



Test terminals



Power supply/ 4 ... 20 mA (U_{aux})



SITRANS TR200, sensor connection assignment

Temperature Measurement

Transmitters for rail mounting

SITRANS TR300 two-wire system, universal, HART

Overview



"HART" to beat - the universal SITRANS TR300 transmitter

- Two-wire devices for 4 to 20 mA, HART
- Device for rail mounting
- Universal input for virtually any type of temperature sensor
- Configurable over HART

Benefits

- Compact design
- Electrically isolated
- Test sockets for multimeters
- Diagnostics LED (green/red)
- Sensor monitoring open circuits and short-circuits
- Self-monitoring
- Configuration status stored in EEPROM
- Expanded diagnostic functions, such as slave pointer, operating hours counter, etc.
- Special characteristic
- Electromagnetic compatibility to EN 61326 and NE21
- SIL2 (with Order Code C20), SIL2/3 (with C23)

Application

SITRANS TR300 transmitters can be used in all industrial sectors. Their compact design enables simple mounting on standard DIN rails on-site in protective boxes or in control cabinets. The following sensors/signal sources can be connected over their universal input module:

- Resistance thermometers (2, 3 or 4-wire system)
- Thermocouples
- Resistance-based sensors and DC voltage sources

The output signal is a direct current from 4 to 20 mA in accordance with the sensor characteristic, superimposed by the digital HART signal.

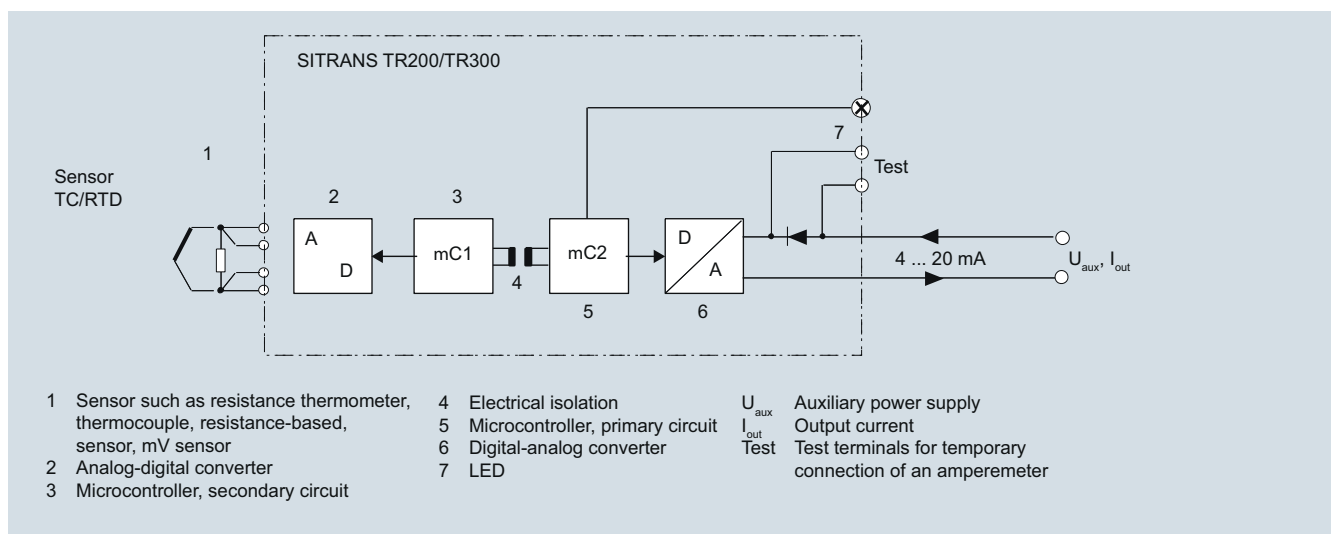
Transmitters of the "intrinsically safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX).

Function

The SITRANS TR300 is configured over HART. This can be done using a handheld communicator or even more conveniently with a HART modem and the SIMATIC PDM parameterization software. The configuration data are then permanently stored in the non-volatile memory (EEPROM).

Once the sensors and power supply have been correctly connected, the transmitter outputs a temperature-linear output signal and the diagnostics LED displays a green light. In the case of a sensor short-circuit, the LED flashes red, an internal device fault is indicated by a steady red light.

The test socket can be used to connect an ammeter at any time for monitoring purposes and plausibility checks. The output current can be read without any interruption, or even without opening the current loop.



SITRANS TR300 function diagram

Technical specifications

Input

Resistance thermometer

Measured variable	Temperature
Sensor type	
<ul style="list-style-type: none"> to IEC 60751 to JIS C 1604; $\alpha=0.00392 \text{ K}^{-1}$ to IEC 60751 Special type 	Pt25 ... Pt1000 Pt25 ... Pt1000 Ni25 ... Pt1000 over special characteristic (max. 30 points)
Sensor factor	0.25 ... 10 (adaptation of the basic type, e.g. Pt100 to version Pt25 ... 1000)
Units	°C or °F
Connection	
<ul style="list-style-type: none"> Standard connection Generation of average value Generation of difference 	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system 2 identical resistance thermometers in 2-wire system for generation of average temperature 2 identical resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)
Interface	
<ul style="list-style-type: none"> Two-wire system Three-wire system Four-wire system 	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance) No balancing required No balancing required
Sensor current	$\leq 0.45 \text{ mA}$
Response time T_{63}	$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: ON)
Measuring range	parameterizable (see table "Digital measuring errors")
Min. measured span	10 °C (18 °F)
Characteristic curve	Temperature-linear or special characteristic

Resistance-based sensors

Measured variable	Actual resistance
Sensor type	Resistance-based, potentiometers
Units	Ω
Connection	
<ul style="list-style-type: none"> Normal connection Generation of average value Generation of difference 	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire system 2 resistance-based sensors in 2-wire system for generation of average value 2 resistance thermometers in 2-wire system (R1 – R2 or R2 – R1)
Interface	
<ul style="list-style-type: none"> Two-wire system Three-wire system Four-wire system 	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance) No balancing required No balancing required
Sensor current	$\leq 0.45 \text{ mA}$

Response time T_{63}

Open-circuit monitoring

Short-circuit monitoring

Measuring range

Min. measured span

Characteristic curve

Thermocouples

Measured variable

Sensor type (thermocouples)

- Type B
- Type C
- Type D

- Type E
- Type J
- Type K

- Type L
- Type N
- Type R

- Type S
- Type T
- Type U

Units

Connection

- Standard connection
- Generation of average value
- Generation of difference

Response time T_{63}

Open-circuit monitoring

Cold junction compensation

- Internal

- External

- External fixed

Measuring range

Min. measured span

Characteristic curve

mV sensor

Measured variable

Sensor type

Units

Response time T_{63}

Open-circuit monitoring

$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring

Always active (cannot be disabled)

can be switched on/off (default value: OFF)

parameterizable max. 0 ... 2200 Ω (see table "Digital measuring errors")

5 ... 25 Ω (see table "Digital measuring errors")

Resistance-linear or special characteristic

Temperature

Pt30Rh-Pt6Rh to DIN IEC 584
W5 %-Re acc. to ASTM 988
W3 %-Re acc. to ASTM 988

NiCr-CuNi to DIN IEC 584
Fe-CuNi to DIN IEC 584
NiCr-Ni to DIN IEC 584

Fe-CuNi to DIN 43710
NiCrSi-NiSi to DIN IEC 584
Pt13Rh-Pt to DIN IEC 584

Pt10Rh-Pt to DIN IEC 584
Cu-CuNi to DIN IEC 584
Cu-CuNi to DIN 43710

°C or °F

1 thermocouple (TC)

2 thermocouples (TC)

2 thermocouples (TC) (TC1 – TC2 or TC2 – TC1)

$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring

Can be switched off

With integrated Pt100 resistance thermometer

With external Pt100 IEC 60571 (2-wire or 3-wire connection)

Cold junction temperature can be set as fixed value

parameterizable (see table "Digital measuring errors")

Min. 40 ... 100 °C (72 ... 180 °F) (see table "Digital measuring errors")

Temperature-linear or special characteristic

DC voltage

DC voltage source (DC voltage source possible over an externally connected resistor)

mV

$\leq 250 \text{ ms}$ for 1 sensor with open-circuit monitoring

Can be switched off

Temperature Measurement

Transmitters for rail mounting

SITRANS TR300 two-wire system, universal, HART

Measuring range	parameterizable max. -100 ... 1100 mV
Min. measured span	2 mV or 20 mV
Overload capability of the input	-1.5 ... +3.5 V DC
Input resistance	≥ 1 MΩ
Characteristic curve	Voltage-linear or special characteristic
Output	
Output signal	4 ... 20 mA, 2-wire with communication acc. to HART Rev. 5.9
Auxiliary power	11 ... 35 V DC (to 30 V for Ex i/ic; to 32 V for Ex nA)
Max. load	(U _{aux} - 11 V)/0.023 A
Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.84 ... 20.5 mA)
Error signal (e.g. following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default value: 22.8 mA)
Sample cycle	0.25 s nominal
Damping	Software filter 1st order 0 ... 30 s (parameterizable)
Protection	Against reversed polarity
Electrical isolation	Input against output (1 kV _{eff})
Measuring accuracy	
Digital measuring errors	see table "Digital measuring errors"
Reference conditions	
• Auxiliary power	24 V ± 1 %
• Load	500 Ω
• Ambient temperature	23 °C
• Warming-up time	> 5 min
Error in the analog output (digital/analog converter)	< 0.025 % of span
Error due to internal cold junction	< 0.5 °C (0.9 °F)
Ambient temperature effect	
• Analog measuring errors of span	< 0.2 % of max. span/10 °C (18 °F)
• Digital measuring errors	
- at resistance thermometers	0.06 °C (0.11 °F)/10 °C (18 °F)
- at thermocouples	0.6 °C (1.1 °F)/10 °C (18 °F)
Auxiliary power effect	< 0.001 % of span/V
Effect of load impedance	< 0.002 % of span/100 Ω
Long-term drift	
• In the first month	< 0.02 % of span in the first month
• After one year	< 0.2 % of span after one year
• After 5 years	< 0.3 % of span after 5 years
Conditions of use	
<u>Ambient conditions</u>	
Ambient temperature range	-40 ... +85 °C (-40 ... +185 °F)
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	< 98 %, with condensation
Electromagnetic compatibility	acc. to EN 61326 and NE21
Design	
Material	Plastic, electronic module potted
Weight	122 g
Dimensions	See "Dimensional drawings"
Cross-section of cables	Max. 2.5 mm ² (AWG 13)
Degree of protection to IEC 60529	
• Enclosure	IP20

Certificates and approvals

Explosion protection ATEX

EC type test certificate

• "Intrinsic safety" type of protection

• Type of protection, "equipment is non-arcing"

Other certificates

PTB 07 ATEX 2032X

II 2(1) G Ex ia/ib IIC T6/T4
II 3(1) G Ex ia/ic IIC T6/T4
II 3 G Ex ic IIC T6/T4
II 2(1) D Ex iaD/ibD 20/21 T115 °C

II 3 G Ex nA IIC T6/T4

NEPSI

Factory setting:

- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Error signal in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Temperature Measurement Transmitters for rail mounting

SITRANS TR300 two-wire system, universal, HART

Digital measuring errors

Resistance thermometer

Input	Measuring range °C / (°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
to IEC 60751					
Pt25	-200 ... +850 (-328 ... +1562)	10	(18)	0.3	(0.54)
Pt50	-200 ... +850 (-328 ... +1562)	10	(18)	0.15	(0.27)
Pt100 ... Pt200	-200 ... +850 (-328 ... +1562)	10	(18)	0.1	(0.18)
Pt500	-200 ... +850 (-328 ... +1562)	10	(18)	0.15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0.15	(0.27)
to JIS C1604-81					
Pt25	-200 ... +649 (-328 ... +1200)	10	(18)	0.3	(0.54)
Pt50	-200 ... +649 (-328 ... +1200)	10	(18)	0.15	(0.27)
Pt100 ... Pt200	-200 ... +649 (-328 ... +1200)	10	(18)	0.1	(0.18)
Pt500	-200 ... +649 (-328 ... +1200)	10	(18)	0.15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0.15	(0.27)
Ni 25 to Ni1000	-60 ... +250 (-76 ... +482)	10	(18)	0.1	(0.18)

Resistance-based sensors

Input	Measuring range Ω	Min. mea- sured span Ω	Digital accuracy Ω
Resistance	0 ... 2200	25	0.25

Thermocouples

Input	Measuring range °C / (°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
Type B	0 ... 1820 (32 ... 3308)	100	(180)	2 ¹⁾	(3.6) ¹⁾
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	2	(3.6)
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.8) ²⁾
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.8)
Type J	-210 ... +1200 (-346 ... +2192)	50	(90)	1	(1.8)
Type K	-230 ... +1370 (-382 ... +2498)	50	(90)	1	(1.8)
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.8)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.8)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type T	-200 ... +400 (-328 ... +752)	40	(72)	1	(1.8)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.6)

¹⁾ The digital accuracy in the range 0 to 300 °C (32 to 572 °F) is 3 °C (5.4 °F).

²⁾ The digital accuracy in the range 1750 to 2300 °C (3182 to 4172 °F) is 2 °C (3.6 °F).

mV sensor

Input	Measuring range mV	Min. mea- sured span mV	Digital accuracy μV
mV sensor	-100 ... +1100	20	400

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0,025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Temperature Measurement

Transmitters for rail mounting

SITRANS TR300 two-wire system, universal, HART

Selection and Ordering data	Article No.
Temperature transmitter SITRANS TR300 For mounting on a standard DIN rail, two-wire system, 4 ... 20 mA, HART, with electrical isolation, with documentation on MiniDVD	
<ul style="list-style-type: none"> Without explosion protection ▶ ◆ 7NG3033-0JN00 With explosion protection to ATEX ▶ ◆ 7NG3033-1JN00 	
Further designs Please add "-Z" to Article No. with and specify Order codes(s).	Order code
With test protocol (5 measuring points)	C11
Functional safety SIL2	C20
Functional safety SIL2/3	C23
Customer-specific programming Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F	Y01¹⁾
Measuring point no. (TAG), max. 8 characters	Y17²⁾
Measuring point descriptor, max. 16 characters	Y23²⁾
Measuring point message, max. 32 characters	Y24²⁾
Text on front label, max. 16 characters	Y29²⁾³⁾
Pt100 (IEC) 2-wire, $R_L = 0 \Omega$	U02⁴⁾
Pt100 (IEC) 3-wire	U03⁴⁾
Pt100 (IEC) 4-wire	U04⁴⁾
Thermocouple type B	U20⁴⁾⁵⁾
Thermocouple type C (W5)	U21⁴⁾⁵⁾
Thermocouple type D (W3)	U22⁴⁾⁵⁾
Thermocouple type E	U23⁴⁾⁵⁾
Thermocouple type J	U24⁴⁾⁵⁾
Thermocouple type K	U25⁴⁾⁵⁾
Thermocouple type L	U26⁴⁾⁵⁾
Thermocouple type N	U27⁴⁾⁵⁾
Thermocouple type R	U28⁴⁾⁵⁾
Thermocouple type S	U29⁴⁾⁵⁾
Thermocouple type T	U30⁴⁾⁵⁾
Thermocouple type U	U31⁴⁾⁵⁾
With TC: CJC external (Pt100, 3-wire)	U41
With TC: CJC external with fixed value, specify in plain text	Y50
Special differing customer-specific programming, specify in plain text	Y09⁶⁾
Fail-safe value 3.6 mA (instead of 22.8 mA)	U36²⁾

Accessories	Article No.
MiniDVD for temperature measuring instruments With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	A5E00364512
HART modem • With USB connection ▶	7MF4997-1DB
Simatic PDM operating software	See Section 8

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

- For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.
- For this selection, Y01 or Y09 must also be selected.
- Text on front plate is not saved in the device.
- For this selection, Y01 must also be selected.
- Internal cold junction compensation is selected as the default for TC.
- For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Supply units see Chapter "Supplementary Components".

Ordering example 1:

7NG3033-0JN00-Z Y01+Y17+Y29+U03
 Y01: -10 ... +100 °C
 Y17: TICA123
 Y29: TICA123

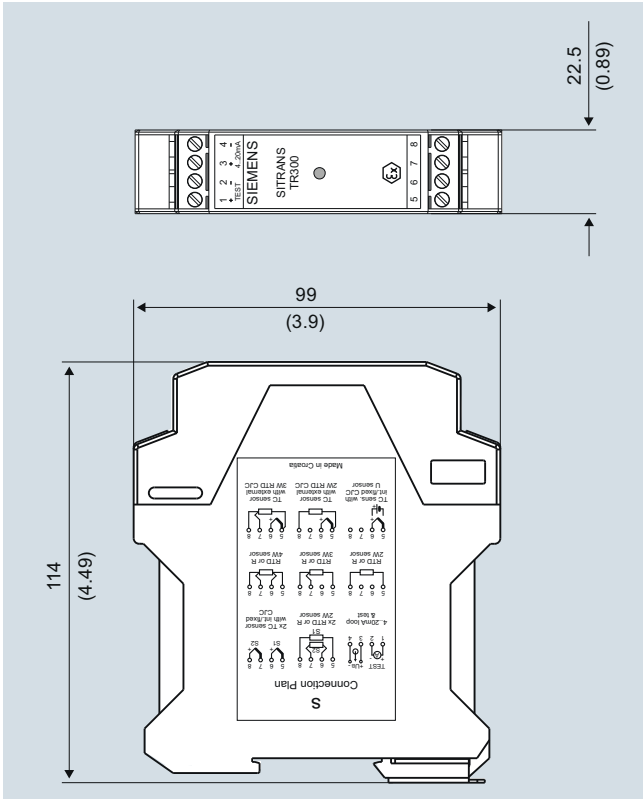
Ordering example 2:

7NG3033-0JN00-Z Y01+Y17+Y23+Y29+U25
 Y01: -10 ... +100 °C
 Y17: TICA123
 Y23: TICA123HEAT
 Y29: TICA123HEAT

Factory setting:

- Pt100 (IEC 751) with 3-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Error signal in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Dimensional drawings



SITRANS TR300, dimensions in mm (inch)

Schematics

Assignments

1 (+) and 2 (-)	Test terminals (Test) for measurement of the output current with a multimeter
3 (+) and 4 (-)	Power supply U_{aux} , Output current I_{out}
5, 6, 7 and 8	Sensor assignment, see schematics

SITRANS TR300, pin assignment

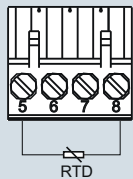
Temperature Measurement

Transmitters for rail mounting

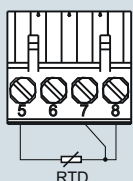
SITRANS TR300 two-wire system, universal, HART

2

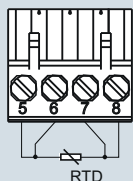
Resistance thermometer



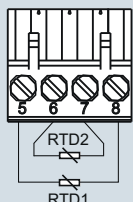
Two-wire system ¹⁾



Three-wire system

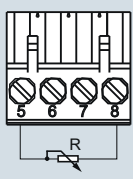


Four-wire system

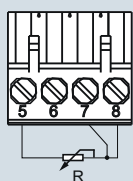


Generation of average value/difference ¹⁾

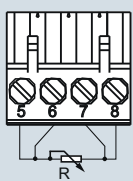
Resistance



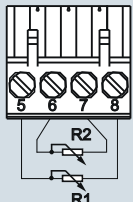
Two-wire system ¹⁾



Three-wire system

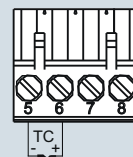


Four-wire system

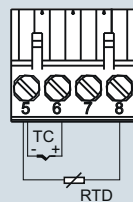


Generation of average value/difference ¹⁾

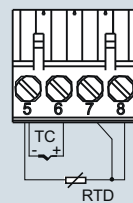
Thermocouple



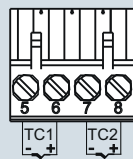
Cold junction compensation internal/fixed value



Cold junction compensation with external Pt100 in two-wire system ¹⁾



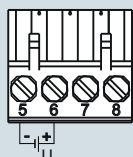
Cold junction compensation with external Pt100 in three-wire system



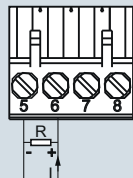
Generation of average value / difference with internal cold junction compensation

¹⁾ Programmable line resistance for the purpose of correction.

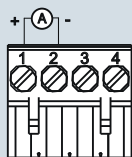
Voltage measurement



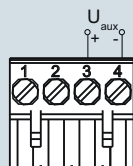
Current measurement



Test terminals



Power supply/ 4 ... 20 mA (U_{aux})



SITRANS TR300, sensor connection assignment

Overview



The user-friendly transmitters for the control room

The SITRANS TW universal transmitter is a further development of the service-proven SITRANS T for the 4-wire system in a mounting rail housing. With numerous new functions it sets new standards for temperature transmitters.

With its diagnostics and simulation functions the SITRANS TW provides the necessary insight during commissioning and operation. And using its HART interface the SITRANS TW can be conveniently adapted with SIMATIC PDM to every measurement task.

All SITRANS TW control room devices are available in a non-intrinsically safe version as well as in an intrinsically safe version for use with the most stringent requirements.

Application

The SITRANS TW transmitter is a four-wire rail-mounted device with a universal input circuit for connection to the following sensors and signal sources:

- Resistance thermometer
- Thermocouples
- Resistance-based sensors/potentiometers
- mV sensors
- As special version:
 - V sources
 - Current sources

The 4-wire rail-mounted SITRANS TW transmitter wire is designed for control room installation. It must not be mounted in potentially explosive atmospheres.

All SITRANS TW control room devices are available in a non-intrinsically safe version as well as in an intrinsically safe version for use with the most stringent requirements.

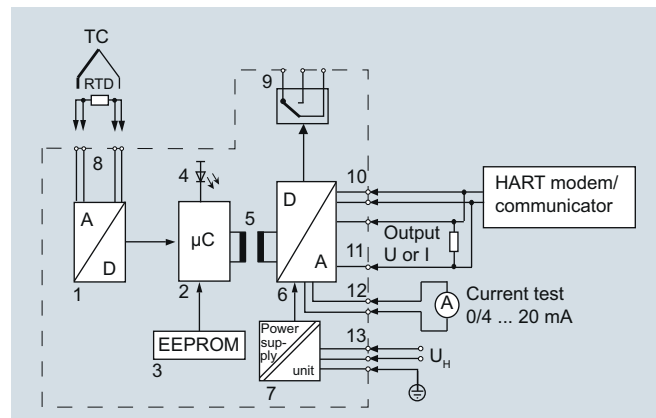
Function

Features

- Transmitter in four-wire system with HART interface
- Housing can be mounted on 35 mm rail or 32 mm G rail
- Screw plug connector
- All circuits electrically isolated
- Output signal: 0/4 to 20 mA or 0/2 to 10 V
- Power supplies: 115/230 V AC/DC or 24 V AC/DC
- Explosion protection [EEx ia] or [EEx ib] for measurements with sensors in the hazardous area
- Temperature-linear characteristic for all temperature sensors

- Temperature-linear characteristic can be selected for all temperature sensors
- Automatic correction of zero and span
- Monitoring of sensor and cable for open-circuit and short-circuit
- Sensor fault and/or limit can be output via an optional sensor fault/limit monitor
- Hardware write protection for HART communication
- Diagnostic functions
- Slave pointer functions
- SIL1

Mode of operation



The signal output by a resistance-based sensor (two-wire, three-wire, four-wire system), voltage source, current source or thermocouple is converted by the analog-to-digital converter (1, function diagram) into a digital signal. This is evaluated in the microcontroller (2), corrected according to the sensor characteristic, and converted by the digital-to-analog converter (6) into an output current (0/4 to 20 mA) or output voltage (0/2 to 10 V). The sensor characteristics as well as the electronics data and the data for the transmitter parameters are stored in the non-volatile memory (3).

AC or DC voltages can be used as the power supply (13). Any terminal connections are possible for the power supply as a result of the bridge rectifier in the power supply unit. The PE conductor is required for safety reasons.

A HART modem or a HART communicator permit parameterization of the transmitter using a protocol according to the HART specification. The transmitter can be directly parameterized at the point of measurement via the HART output terminals (10).

The operation indicator (4) identifies a fault-free or faulty operating state of the transmitter. The limit monitor (9) enables the signaling of sensor faults and/or limit violations. In the case of a current output, the current can be checked on a meter connected to test socket (12).

Diagnosis and simulation functions

The SITRANS TW comes with extensive diagnosis and simulation functions.

Physical values can be defined with the simulation function. It is thus possible to check the complete signal path from the sensor input to inside the control system without additional equipment. The slave pointer functions are used to record the minimum and maximum of the plant's process variable.

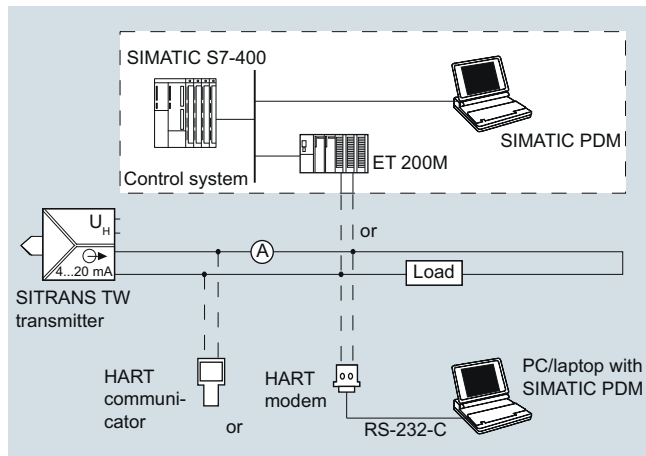
Temperature Measurement

Transmitters for rail mounting

SITRANS TW four-wire system, universal, HART

Integration

System configuration



Possible system configurations

The SITRANS TW transmitter as a four-wire rail-mounted device can be used in a number of system configurations: as a stand-alone version or as part of a complex system environment, e.g. with SIMATIC S7. All device functions are available via HART communication.

Communication options through the HART interface:

- HART communicator
- HART modem connected to PC/laptop on which the appropriate software is available, e.g. SIMATIC PDM
- HART-compatible control system (e.g. SIMATIC S7-400 with ET 200M)

Technical specifications

Input

Selectable filters to suppress the line frequency

50 Hz, 60 Hz, also 10 Hz for special applications (line frequency filter is similar with measuring frequency)

Resistance thermometer

Measured variable

Temperature

Measuring range

Parameterizable

Measuring span

min. 25 °C (45 °F) x 1/scaling factor

Sensor type

- Acc. to IEC 751
- Acc. to JIS C 1604-81
- to DIN 43760
- Special type ($R_{RTD} \leq 500 \Omega$)

Pt100 (IEC 751)

Pt100 (JIS C 1604-81)

Ni100 (DIN 43760)

Multiples or parts of the defined characteristic values can be parameterized (e.g. Pt500, Ni120)

Characteristic curve

Temperature-linear, resistance-linear or customer-specific

Type of connection

- Normal connection
- Sum or parallel connection
- Mean-value or differential connection

Interface

2, 3 or 4-wire circuit

Measuring range limits

Depending on type of connected thermometer (defined range of resistance thermometer)

Sensor breakage monitoring

Monitoring of all connections for open-circuit (function can be switched off)

Sensor short-circuit monitoring

Parameterizable response threshold (function can be switched off)

Resistance-based sensor, potentiometer

Measured variable

Actual resistance

Measuring range

Parameterizable

Measuring span

min. 10 Ω

Characteristic curve

Resistance-linear or customer-specific

Type of connection

- Normal connection
- Differential connection
- Mean-value connection

Interface

2, 3 or 4-wire circuit

Input range

0 ... 6000 Ω ;
with mean-value and difference circuits: 0 ... 3000 Ω

Sensor breakage monitoring

Monitoring of all connections for open-circuit (function can be switched off)

Sensor short-circuit monitoring

Parameterizable response threshold (function can be switched off)

Temperature Measurement Transmitters for rail mounting

SITRANS TW four-wire system, universal, HART

<u>Thermocouples</u>		<u>µA-, mA sources</u>	
Measured variable	Temperature	Measured variable	DC voltage
Measuring range	Parameterizable	Measuring range	Parameterizable
Measuring span	min. 50 °C (90 °F) x 1/scaling factor	Characteristic curve	Current-linear or customer-specific
Measuring range limits	Depend. on type of thermocouple element	Input range/min. span	
Thermocouple element	Type B: Pt30 %Rh/Pt6 %Rh (DIN IEC 584) Type C: W5 %-Re (ASTM 988) Type D: W3 %-Re (ASTM 988) Type E: NiCr/CuNi (DIN IEC 584) Type J: Fe/CuNi (DIN IEC 584) Type K: NiCr/Ni (DIN IEC 584) Type L: Fe-CuNi (DIN 43710) Type N: NiCrSi-NiSi (DIN IEC 584) Type R: Pt13 %Rh/Pt (DIN IEC 584) Type S: Pt10 %Rh/Pt (DIN IEC 584) Type T: Cu/CuNi (DIN IEC 584) Type U: Cu/CuNi (DIN 43710) Special type (-10 mV ≤ UTC ≤ 100 mV)	<ul style="list-style-type: none"> • Devices with 7NG3242-xxxx4 • Devices with 7NG3242-xxxx5 • Devices with 7NG3242-xxxx6 • Devices with 7NG3242-xxxx7 or 7NG3242-xxxx0 with U/I plug • Devices with 7NG3242-xxxx8 Sensor breakage monitoring Not possible	-12 ... +100 µA/0.4 µA -120 ... +1000 µA/4 µA -1.2 ... +10 mA/0.04 mA -12 ... +100 mA/0.4 mA -120 ... +1000 mA/4 mA
Characteristic curve	Temperature-linear, voltage-linear or customer-specific	Output	
Type of connection	<ul style="list-style-type: none"> • Normal connection • Averaging connection • Mean-value connection • Differential connection 	<u>Output signal</u>	Load-independent direct current 0/4 ... 20 mA, can be switched to load-independent DC voltage 0/2 ... 10 V using plug-in jumpers
Cold junction compensation	None, internal measurement, external measurement or pre-defined fixed value	Current 0/4 ... 20 mA	
Sensor breakage monitoring	Function can be switched off	<ul style="list-style-type: none"> • Overrange 	-0.5 ... +23.0 mA, continuously adjustable
<u>mV sensors</u>		<ul style="list-style-type: none"> • Output range following sensor fault (conforming to NE43) • Load • No-load voltage 	-0.5 ... +23.0 mA, continuously adjustable ≤ 650 Ω ≤ 30 V
Measured variable	DC voltage	Voltage 0/2 ... 10 V	
Measuring range	Parameterizable	<ul style="list-style-type: none"> • Overrange 	-0.25 ... +10.75 V, continuously adjustable
Measuring span	min. 4 mV	<ul style="list-style-type: none"> • Output range following sensor fault • Load resistance • Load capacitance • Short-circuit current 	-0.25 ... +10.75 V, continuously adjustable ≥ 1 kΩ ≤ 10 nF
Input range	-120 ... +1000mV	<ul style="list-style-type: none"> • Electrical damping - adjustable time constant T_{63} • Current source/voltage source 	0 ... 100 s, in steps of 0.1 s Continuously adjustable within the total operating range
Characteristic curve	Voltage-linear or customer-specific	<u>Sensor fault/limit signalling</u>	By operation indicator, relay output or HART interface
Overload capacity of inputs	max. ± 3.5 V	Operation indicator	Flashing signal
Input resistance	≥ 1 MΩ	<ul style="list-style-type: none"> • Limit violation • Sensor fault monitoring 	Flashing frequency 5 Hz Flashing frequency 1 Hz
Sensor current	Approx. 180 µA	Relay outputs	Either as NO or NC contact with 1 changeover contact
Sensor breakage monitoring	Function can be switched off	<ul style="list-style-type: none"> • Switching capacity • Switching voltage • Switching current 	≤ 150 W, ≤ 625 VA ≤ 125 V DC, ≤ 250 V AC ≤ 2.5 A DC
<u>V sources</u>		Sensor fault monitoring	Signalling of sensor or line breakage and sensor short-circuit
Measured variable	DC voltage	Limit monitoring	
Measuring range	Parameterizable	<ul style="list-style-type: none"> • Operating delay • Monitoring functions of limit module 	0 ... 10 s
Characteristic curve	Voltage-linear or customer-specific		<ul style="list-style-type: none"> • Sensor fault (breakage and/or short-circuit) • Lower and upper limit • Window (combination of lower and upper limits) • Limit and sensor fault detection can be combined
Input range/min. span			
<ul style="list-style-type: none"> • Devices with 7NG3242-xxxx1 or 7NG3242-xxxx0 with U/I plug • Devices with 7NG3242-xxxx2 • Devices with 7NG3242-xxxx3 	-1.2 ... + 10 V/0.04 V -12 ... +100 V/0.4 V -120 ... +140 V/4.0 V		
Sensor breakage monitoring	Not possible	<ul style="list-style-type: none"> • Hysteresis 	Parameterizable between 0 and 100 % of measuring range

Temperature Measurement

Transmitters for rail mounting

SITRANS TW four-wire system, universal, HART

Auxiliary power Universal power supply unit Tolerance range for power supply <ul style="list-style-type: none"> • With 115/230 V AC/DC PSU • With 24 V AC/DC PSU Tolerance range for mains frequency Power consumption with <ul style="list-style-type: none"> • 230 V AC • 230 V DC • 24 V AC • 24 V DC 		115/230 V AC/DC or 24 V AC/DC 80 ... 300 V DC; 90 ... 250 V AC 18 ... 80 V DC; 20.4 ... 55.2 V AC (in each case interruption-resistant up to 20 ms in the complete tolerance range) 47 ... 63 Hz ≤ 5 VA ≤ 5 W ≤ 5 VA ≤ 5 W	Certificates and approvals ATEX Intrinsic safety to EN 50 020 <ul style="list-style-type: none"> • for 7NG3242-xAxxx • for 7NG3242-xBxxx EC type-examination certificate Other certificates		To DIN EN 50014: 1997, EN 50020: 1994 II (1) G D [Ex ia/ib] IIB II (1) G D [Ex ia/ib] IIC TÜV (German Technical Inspectorate) 01 ATEX 1675 GOST, NEPSI	
Electrically isolated Electrically isolated circuits Working voltage between all electrically isolated circuits		Input, output, power supply and sensor fault/limit monitoring output are electrically isolated from one another. The HART interface is electrically connected to the output. The voltage U_{rms} between any two terminals must not exceed 300 V	Conditions of use <u>Installation conditions</u> Location (for devices with explosion protection) <ul style="list-style-type: none"> • Transmitters • Sensor <u>Ambient conditions</u> Permissible ambient temperature Permissible storage temperature Climatic class <ul style="list-style-type: none"> • Relative humidity 		Outside the potentially explosive atmosphere Within the potentially explosive atmosphere zone 1 (also in zone 0 in conjunction with the prescribed protection requirements for the sensor) -25 ... +70 °C (-13 ... +158 °F) -40 ... +85 °C (-40 ... +185 °F) 5 ... 95 %, no condensation	
Measuring accuracy Accuracy <ul style="list-style-type: none"> • Error in the internal cold junction • Error of external cold junction terminal 7NG3092-8AV • Digital output • Analog output I_{AN} or U_{AN} Influencing effects (referred to the digital output) <ul style="list-style-type: none"> • Temperature drift • Long-term drift Influencing effects referred to the analog output I_{AN} or U_{AN} <ul style="list-style-type: none"> • Temperature drift • Power supply • Load with current output • Load with voltage output • Long-term drift (start-of-scale value, span) Response time (T_{63} without electrical damping)		≤ 3 °C ± 0.1 °C / 10 °C (≤ 5.4 °F ± 0.18 °F / 18 °F) ≤ 0.5 °C ± 0.1 °C / 10 °C (≤ 0.9 °F ± 0.18 °F / 18 °F) See "Digital error" ≤ 0.05 % of the span plus digital error Compared to the max. span: ≤ 0.08 % / 10 °C (≤ 0.08 % / 18 °F) ≤ 0.2 % in the range -10 ... +60 °C (14 ... 140 °F) ≤ 0.1 % / year Compared to the span: ≤ 0.08 % / 10 °C (≤ 0.08 % / 18 °F) ≤ 0.2 % in the range -10 ... +60 °C (14 ... 140 °F) ≤ 0.05 % / 10 V ≤ 0.05 % on change from 50 Ω to 650 Ω ≤ 0.1 % on change in the load current from 0 mA to 10 mA ≤ 0.03 % / month ≤ 0.2 s	Design Weight Enclosure material Degree of protection to IEC 529 Degree of protection to VDE 0100 Type of installation Electrical connection / process connection		Approx. 0.24 kg (0.53 lb) PBT, glass-fibre reinforced IP20 Protection class I 35-mm DIN rail (1.38 inch) (EN 50022) or 32-mm G-type rail (1.26 inch) (EN 50035) Screw plug connectors, max. 2.5 mm ² (0.01 inch ²)	
Electromagnetic compatibility		According to EN 61 326 and NAMUR NE21		Parameterization interface Protocol Load with connection of <ul style="list-style-type: none"> • HART communicator • HART modem Software for PC/laptop		HART, version 5.9 230 ... 650 Ω 230 ... 500 Ω SIMATIC PDM version V5.1 and later

Digital error

Resistance thermometer

Input	Measuring range	Max. permissible line resistance	Digital error
	°C / (°F)		Ω
IEC 751			
• Pt10	-200 ... +850 (-328 ... +1562)	20	3.0 (5.4)
• Pt50	-200 ... +850 (-328 ... +1562)	50	0.6 (1.1)
• Pt100	-200 ... +850 (-328 ... +1562)	100	0.3 (0.5)
• Pt200	-200 ... +850 (-328 ... +1562)	100	0.6 (1.1)
• Pt500	-200 ... +850 (-328 ... +1562)	100	1.0 (1.8)
• Pt1000	-200 ... +850 (-328 ... +1562)	100	1.0 (1.8)
JIS C 1604-81			
• Pt10	-200 ... +649 (-328 ... +1200)	20	3.0 (5.4)
• Pt50	-200 ... +649 (-328 ... +1200)	50	0.6 (1.1)
• Pt100	-200 ... +649 (-328 ... +1200)	100	0.3 (0.5)
DIN 43760			
• Ni50	-60 ... +250 (-76 ... +482)	50	0.3 (0.5)
• Ni100	-60 ... +250 (-76 ... +482)	100	0.3 (0.5)
• Ni120	-60 ... +250 (-76 ... +482)	100	0.3 (0.5)
• Ni1000	-60 ... +250 (-76 ... +482)	100	0.3 (0.5)

Resistance-based sensors

Input	Measuring range	Max. permissible line resistance	Digital error
	Ω		Ω
Resistance (linear)	0 ... 24	5	0.08
	0 ... 47	15	0.06
	0 ... 94	30	0.06
	0 ... 188	50	0.08
	0 ... 375	100	0.1
	0 ... 750	100	0.2
	0 ... 1500	75	1.0
	0 ... 3000	100	1.0
	0 ... 6000	100	2.0

Thermocouples

Input	Measuring range	Digital error ¹⁾
	°C / (°F)	°C (°F)
Type B	0 ... +1820 (+32 ... +3308)	3 (5.4)
Type C	0 ... +2300 (+32 ... +4172)	2 (3.6)
Type D	0 ... +2300 (+32 ... +4172)	1 (1.8)
Type E	-200 ... +1000 (-328 ... +1832)	1 (1.8)
Type J	-210 ... +1200 (-346 ... +2192)	1 (1.8)
Type K	-200 ... +1372 (-328 ... +2501)	1 (1.8)
Type L	-200 ... +900 (-328 ... +1652)	2 (3.6)
Type N	-200 ... +1300 (-328 ... +2372)	1 (1.8)
Type R	-50 ... +1760 (-58 ... +3200)	2 (3.6)
Type S	-50 ... +1760 (-58 ... +3200)	2 (3.6)
Type T	-200 ... +400 (-328 ... +752)	1 (1.8)
Type U	-200 ... +600 (-328 ... +1112)	2 (3.6)

¹⁾ Accuracy data refer to the largest error in the complete measuring range

Voltage/current sources

Input	Measuring range	Digital error
mV sources (linear)	mV	μV
	-1 ... +16	35
	-3 ... +32	20
	-7 ... +65	20
	-15 ... +131	50
	-31 ... +262	100
	-63 ... +525	200
	-120 ... +1000	300
V sources (linear)	V	mV
	-1.2 ... +10	3
	-12 ... +100	30
	-120 ... +140	300
μA/mA sources (linear)	μA/mA	μA
	-12 ... +100 μA	0.05
	-120 ... +1000 μA	0.5
	-1.2 ... +10 mA	5
	-12 ... +100 mA	50
	-120 ... +1000 mA	500

Temperature Measurement

Transmitters for rail mounting

SITRANS TW four-wire system, universal, HART

Ordering examples

Desired transmitter	Parameter:		Ordering design
	Standard	Special	
Example 1: SITRANS TW, transmitter in four-wire system <ul style="list-style-type: none"> • with explosion protection ATEX • 230 V AC/DC power supply • current output • without sensor fault/limit monitor <ul style="list-style-type: none"> - Sensor PT100, three-wire circuit - Measuring range 0 ... 150 °C - Temperature-linear characteristic - Filter time 1 s - Output 4 ... 20 mA, line filter 50 Hz - Output driven to full-scale in event of like breakage 	X		7NG3242-1AA00 (stock item)
Example 2: SITRANS TW, transmitter in four-wire system <ul style="list-style-type: none"> • without explosion protection • 24 V AC/DC power supply • Voltage output • Sensor fault/limit monitor <ul style="list-style-type: none"> - Rating plate in English - Sensor NiCr/Ni, type K - Cold junction internal - Measuring range 0 ... 950 °C - Temperature-linear characteristic - Filter time 1 s - Output 0 ... 10 V, line filter 50 Hz - Output driven to full-scale in event of like breakage - Limit monitoring switched off 	X	S76 A05 Y30	7NG3242-0BB10-Z Y01 + S76 + A05 + Y30 + H10 Y01: see Order code Y30: MA=0; ME= 950; D=C
Example 3: SITRANS TW, transmitter in four-wire system <ul style="list-style-type: none"> • without explosion protection • 24 V AC/DC power supply • Current output • without sensor fault/limit monitor <ul style="list-style-type: none"> - Voltage input, measuring range -1.2 V ... +10 V - Measuring range 0 ... 5 V - Source-proportional characteristic - Filter time 10 s - Output 0 ... 20 mA, line filter 60 Hz - No monitoring for sensor fault 	(X)	A40 Y32 G07 H11 J03	7NG3242-0BA01-Z Y01 + A40 + Y32 + G07 + H11 + J03 Y01: see Order code Y32: MA=0; ME= 5; D=V

Ordering information

The article number structure shown below is used to specify a fully functioning transmitter. The selection of the operating data (type of source, measuring range, characteristic etc.) is made according to the following rules:

- Operating data already set in factory to default values:
The default settings can be obtained from the list of parameterizable operating data (see "Special operating data"). The presets can be modified by the customer to match the requirements precisely.
- Operating data set on delivery according to customer requirements:
Supplement the Article No. by "-Z" and add the Order code "Y01". The operating data to be set can be obtained from the list of parameterize operating data. The Order codes A ■■ to K ■■ for operating data to be set need only be specified in the order if they deviate from the default setting.
The default setting is used if no Order code is specified for operating data.

The selected parameters are printed on the transmitter's rating plate.

Selection and Ordering data	Article No.
SITRANS TW universal transmitter for rail mounting, in four-wire system (order instruction manual separately) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7 NG 3 2 4 2 -
Explosion protection Without ▶◆ 0 For inputs [EEx ia] or [EEx ib] ▶◆ 1	
Power supply 115/230 V AC/DC ▶◆ A 24 V AC/DC ▶◆ B	
Output signal 0/4 ... 20 mA (can be switched to 0/2 ... 10 V) ▶◆ A 0/2 ... 10 V (can be switched to 0/4 ... 20 mA) ▶◆ B	
Sensor fault/limit monitor Without (retrofitting not possible) ▶◆ 0 Relay with changeover contact ▶◆ 1	
Input for Temperature sensor, resistance-based sensor and mV sensor with measuring range -120 ... +1000 mV DC and with U/I plug Voltage input (V sources) ¹⁾ Measuring range: • -1.2 ... +10 V DC 1 • -12 ... +100 V DC (not Ex version) 2 • -120 ... +140 V DC (not Ex version) 3 Current input (µA, mA sources) ¹⁾ Measuring range: • -12 ... +100 µA DC 4 • -120 ... +1000 µA DC 5 • -1.2 ... +10 mA DC 6 • -12 ... +100 mA DC 7 • -120 ... +1000 mA DC 8	
Further designs Please add "-Z" to Article No. and specify Order code(s) (see "List of parameterizable operating data").	Order code
Customer-specific setting of operating data (see "List of parameterizable operating data")	Y01
Note: specify in plain text: „see Order code“	
Meas. point description (max. 16 char.)	Y23
Text on front of device (max. 32 char.)	Y24
HART tag (max. 8 characters)	Y25
With test report	P01
With shorting plug to HART communication for 0 mA or 0 V	S01
With plug for external cold junction compensation	S02
With U/I plug (-1.2 ... +10 V DC or -12 ... +100 mA)	S03
Language of rating plate (together with Y01 Order Code only)	
• Italian	S72
• English	S76
• French	S77
• Spanish	S78

¹⁾ Observe max. values with Ex version.

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.
Accessories	
MiniDVD for temperature measuring instruments ▶	A5E00364512
With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	
Instruction Manual for SITRANS TW	
German/English ▶	A5E00054075
French/Italian/Spanish ▶	A5E00064515
Cold junction terminal ▶	7NG3092-8AV
U/I plug (-1.2 ... +10 V DC pr -12 ... +100 mA) ▶	7NG3092-8AW
SIMATIC PDM operating software	see Chapter 8
HART modem	
With USB interface ▶	7MF4997-1DB

Temperature Measurement Transmitters for rail mounting

SITRANS TW four-wire system, universal, HART

List of parameterizable operating data (Order codes F ■ ■ ■ ... K ■ ■ ■)

Operating data according to default setting		Article No. with Order code: 7NG3242 - ■ ■ ■ ■ ■ -Z Y01											
Order codes: F ■ ■ ■ ... K ■ ■ ■		■ ■ ■	+	■ ■ ■	+	■ ■ ■	+	■ ■ ■	+	■ ■ ■			
Sensor													
Thermocouple elements		Voltage measurement		Filter time¹⁾		Output signal and line filter²⁾		Failure signal		Limit monitor³⁾			
Type	Temperature range												
B: Pt30 %Rh/ C:W5 %Re	0 ... 1820 °C	A 0 0	Temperature-linear	F 0 0	0 s	G 0 0	4 ... 20 mA/ 2 ... 10 V	with line breakage/fault: to full scale to start of scale hold last value	J 0 0 J 0 1 J 0 2	Limit monitoring ineffective (but sensor fault signalling with closed-circuit operation)	K 0 0		
D:W3 %Re	0 ... 2300 °C	A 0 1		F 1 0	0.1 s	G 0 1							
E: NiCr/CuNi	-200 ... +1000 °C	A 0 2	Voltage-linear		0.2 s	G 0 2	with line filter:						
J: Fe/CuNi (IEC)	-210 ... +1200 °C	A 0 3			0.5 s	G 0 3	50 Hz						
K: NiCr/Ni	-200 ... +1372 °C	A 0 4			1 s	G 0 4	60 Hz						
L: Fe/CuNi (DIN)	-200 ... +900 °C	A 0 5			2 s	G 0 5	10 Hz ⁴⁾	H 0 0	J 0 2				
N: NiCrSi/NiSi	-200 ... +1300 °C	A 0 6			5 s	G 0 6	0 ... 20 mA/ 0 ... 10 V	no monitoring	J 0 3	Effective ⁵⁾	Y 7 0		
R: Pt13 %Rh/Pt	-50 ... +1760 °C	A 0 7			10 s	G 0 7							
S: Pt10 %Rh/Pt	-50 ... +1760 °C	A 0 8			20 s	G 0 8	with line filter:	Safety value ⁵⁾	Y 6 0				
T: Cu/CuNi (IEC)	-200 ... +400 °C	A 0 9			50 s	G 0 9	50 Hz			H 1 0			
U: Cu/CuNi (DIN)	-200 ... +600 °C	A 1 0			100 s	G 1 0	60 Hz			H 1 1			
		A 1 1			Special time ⁵⁾	Y 5 0	10 Hz	H 1 2					
Resistance thermometer (max. permissible line resistances see „Technical specifications“)			Voltage measurement		Filter time¹⁾		Output signal and line filter²⁾		Failure signal		Limit monitor³⁾		
Pt100 (DIN IEC)	-200 ... +850 °C	A 2 0	Temperature-linear	F 0 0	same as for thermocouple elements		same as for thermocouple elements	with line breakage/fault: to full scale to start of scale hold last value	J 0 0 J 0 1 J 0 2	same as for thermocouple elements			
Pt100 (JIS)	-200 ... +649 °C	A 2 1									J 0 3		
Ni100 (DIN)	-60 ... +250 °C	A 2 2	Resistance-linear	F 2 0							Safety value ⁵⁾	Y 6 0	
								with line breakage or short-circuit/fault: to full scale to start of scale hold last value	J 1 0 J 1 1 J 1 2				
								no monitoring	J 1 3				
								Safety value ⁵⁾	Y 6 1				
Resistance-based sensors, potentiometers (max. permissible line resistances see „Technical specifications“)		A 3 0	Voltage measurement		Filter time¹⁾		Output signal and line filter²⁾		Failure signal		Limit monitor³⁾		
			Resistance-linear	F 2 0	same as for thermocouple elements		same as for thermocouple elements	with line breakage/fault: to full scale to start of scale hold last value	J 0 0 J 0 1 J 0 2	same as for thermocouple elements			
											J 0 3		
											Safety value ⁵⁾	Y 6 0	
mV, V and μA, mA sources		A 4 0	Voltage measurement		Filter time¹⁾		Output signal and line filter²⁾		Failure signal		Limit monitor³⁾		
			Source proportional	F 3 0	same as for thermocouple elements		same as for thermocouple elements				same as for thermocouple elements		

¹⁾ Software filter to smooth the result

²⁾ Filter to suppress line disturbances on the measured signal.

³⁾ If signalling relay present

⁴⁾ for special applications

⁵⁾ Operating data: see „Special operating data“

Temperature Measurement

Transmitters for rail mounting

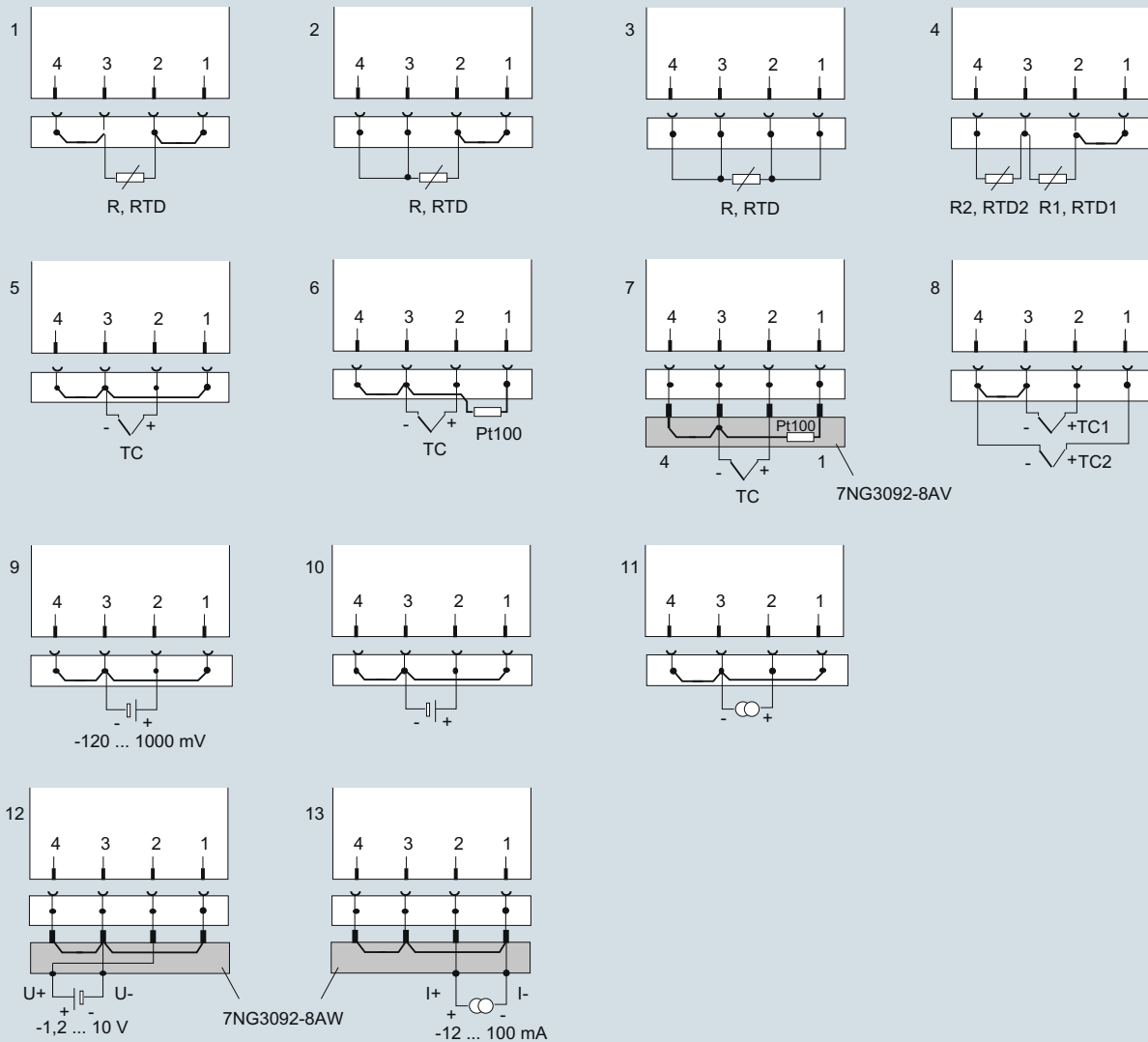
SITRANS TW four-wire system, universal, HART

Special operating data

Order code	Plain text required	Options
Y00	N=□□.□□	Factor N for multiplication with the characteristic values of resistance thermometers Range of values: 0.10 to 10.00 1. Example: 3 x Pt500 parallel: N = 5/3 = 1.667; 2. Example: Ni120: N = 1.2
Y10	TV=□□□□.□□ D=□	Temperature TV of the fixed cold junction Dimension; range of values: C, K, F, R
Y11	RL=□□□.□□	Line resistance RL in Ω for compensation of cold junction line of external Pt100 DIN IEC 751 Range of values: 0.00 to 100.00
Y20	RL1=□□□.□□ RL2=□□□.□□	Line resistances RL of channel 1 (RL1) and channel 2 (RL2) in Ω if the resistance thermometer or the resistance-based sensor is connected in a two-wire system Range of values depending on type of sensor: 0.00 to 100.00
Y30	MA=□□□□.□□ ME=□□□□.□□ D=□	Start-of-scale value MA and full-scale value ME for thermocouples and resistance thermometers (Range of values depending on type of sensor) Dimension, range of values: C, K, F, R)
Y31	MA=□□□□.□□ ME=□□□□.□□	Start-of-scale value MA and full-scale value ME for resistance-based sensors or potentiometers in Ω Range of values: 0.00 to 6,000.00
Y32	MA=□□□□.□□ ME=□□□□.□□ D=□□	Start-of-scale value MA and full-scale value ME for mV, V, μ A and mA sources Range of values depending on type of sensor: -120.00 to 1,000.00 Dimension (mV entered as MV, V as V, μ A as UA, mA as MA)
Y50	T63=□□□.□	Response time T63 of software filter in s Range of values: 0.0 to 100.0 Safety value S of signal output in mA or in V corresponding to the set type of output. Range of values - with current output: -0.50 to 23.00 - with voltage output: -0.25 to 10.75
Y60	S=□□.□□	Safety value S with line breakage of sensor
Y61	S=□□.□□	Safety value S with line breakage or short-circuit of sensor
Y70	UG=□□□□.□□ OG=□□□□.□□ H=□□□□.□□ K=□ A=□ T=□□.□	Lower limit value (dimension as defined by measuring range) Upper limit value (dimension as defined by measuring range) Hysteresis (dimension as defined by measuring range) Switch on/off combination of limit function and sensor fault detection; J=on; N=off (standard: J) Type of relay output: A=open-circuit operation; R=closed-circuit operation (standard: R) Switching delay T of relay output in s Range of values: 0.0 to 10.0 (standard: 0.0)

Schematics

Sensor input connections



Resistance thermometers, resistance-based sensors, potentiometers:

- 1 Two-wire system; resistance can be parameterized for line compensation
- 2 Three-wire system
- 3 Four-wire system
- 4 Difference/mean-value circuit; 2 resistors can be parameterized for line compensation

Thermocouples:

- 5 Determination of cold junction temperature using built-in Pt100 or fixed reference temperature
- 6 Determination of cold junction temperature using external Pt100; resistance can be parameterized for line compensation
- 7 Determination of cold junction temperature using cold junction terminal 7NG3092-8AV
- 8 Difference/mean-value circuit with internal cold junction temperature

Further sources:

- 9 mV sources with two-wire system (7NG3242-xxxx0)
- 10 V sources with two-wire system (7NG3242-xxxx[1-3])
- 11 mA/mA sources with two-wire system (7NG3242-xxxx[4-8])
- 12 Voltage measurement -1,2 to 10 V with U/I plug 7NG3092-8AW (7NG3242-xxxx0)
- 13 Current measurement -12 to 100 mA with U/I plug 7NG3092-8AW (7NG3242-xxxx0)

Connection diagram for the input signal

Channel 1 is the measured variable between the terminals 2 and 3 on the input plug. With a difference or mean-value circuit, the calculation of the measured value is defined by the type of measurement. Otherwise the measured value is determined via channel 1. The following code is used for the type of measurement:

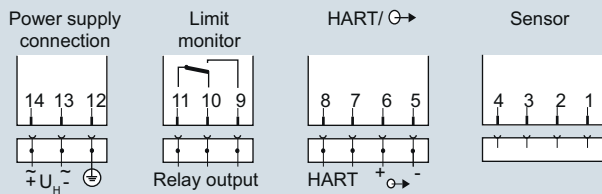
type of measurement	Calculation of measured value
Single channel	Channel 1
Differential connection 1	Channel 1 - Channel 2
Differential connection 2	Channel 2 - Channel 1
Mean-value 1	$\frac{1}{2} \cdot (\text{Channel 1} + \text{Channel 2})$

The short-circuit jumpers shown in the circuits must be inserted in the respective system on site.

Temperature Measurement

Transmitters for rail mounting

SITRANS TW four-wire system, universal, HART



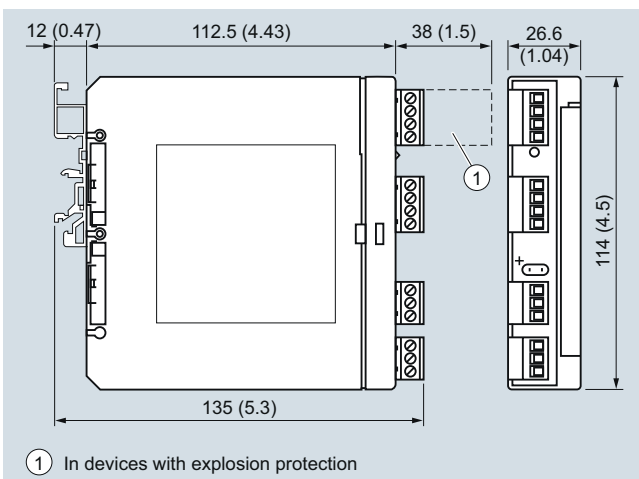
- 1 to 4 Signal input (see "sensor input connections" for possible types of connection)
- 5, 6 Analog output (U or I output parameterizable using plug-in jumpers)
- 7, 8 Connection with HART communication for local parameterization
- 9 to 11 Output for sensor fault/limit monitor as relay contact (see below for possible parameterization)
- 12 PE connection
- 13, 14 Power supply input (protected against reverse polarity)

Connection diagram for power supply, input and outputs

Relay outputs

	Connected terminals
Closed-circuit operation (relay opens when error)	
• Device switched off	10 and 11
• Device switched on and no error	9 and 11
• Device switched on and error	10 and 11
Open-circuit operation (relay closes when error)	
• Device switched off	10 and 11
• Device switched on and no error	10 and 11
• Device switched on and error	9 and 11

Dimensional drawings



Dimensions for control room mounting, rail mounting in mm (inches)

Overview



SITRANS TF280 for flexible and cost-effective temperature measurements

- Supports the WirelessHART standard (HART V 7.1)
- Very high security level for wireless data transmission
- Built-in local user interface (LUI) with 3-button operation
- Optimum representation and readability using graphical display (104 x 80 pixels) with integrated backlight
- Stand-by (deep sleep phase) mode can be turned on and off with push of a button
- Battery power supply
- Battery life time up to 5 years
- Extend battery life time with HART modem interface which can be switch off
- Optimized power consumption through new design, and increase in battery life time
- Simple configuration thanks to SIMATIC PDM
- Housing meets IP65 degree of protection
- Supports all Pt100 sensors as per IEC 751/DIN EN 60751

Benefits

The SITRANS TF280 is a temperature transmitter that features WirelessHART as the standard communication interface.

Also available is a wired interface to connect a HART modem:

- Flexible temperature measurement
- Save costs on wiring at difficult installation conditions. Wireless technology offers cost advantages in cases where extensive wiring costs would normally apply.
- It enables additional hitherto unfeasible measuring points, particularly for monitoring purposes
- Easy installation also on moveable equipment parts
- Enables cost-effective temporary measurements, for example for process optimizations.
- Optimum solution in addition to wired communication and for system solutions in process automation

Application

The SITRANS TF280 is a WirelessHART field device for temperature measurement with a Pt100 sensor.

This sensor can be installed directly on the field device, or connected at an offset with a cable connection. On the wireless communication side, the transmitter supports the WirelessHART standard. A HART modem can be connected to the transmitter particularly for initial parameterization. Alternatively the device can be commissioned comfortably by means of the local push-buttons w/o any additional handset devices.

It can be used in all industries and applications in non-explosive areas.

Design

The SITRANS TF280 has a robust aluminum enclosure and is suitable for outside use. It conforms with the IP65 safety class.

The operation temperature range is -40 to +80 °C (-40 to +176 °F). Power supply is provided through an integrated battery, which is available as an accessory. The device is only approved for operation with this battery.

The antenna features a rotatable joint which can be used for directional alignment. Wireless signals can thus be optimally received and transmitted.

A special highlight is the possibility to operate directly on the device with 3 push buttons. It perfectly matches the strategy of all new Siemens field devices.

Using the device's push buttons, it is easy to turn the HART modem interface of the device on and off. The device can be put to passive status and reactivated at any time. This helps to extend the life time of the battery.

The SITRANS TF280 transmitter features a cable gland or a Pt100 sensor including protective piping.

Function

The SITRANS TF280 can join to a WirelessHART network. It can be parameterized and operated through this network. Measured process values are transmitted via the network to the SIEMENS IE/WSN-PA LINK.

Field device data received by the IE/WSN-PA LINK is transmitted to the connected systems, for example the process control system SIMATIC PCS 7. For an introduction of WirelessHART, please see the FI 01 catalogue Sec. 8 or www.siemens.com/wirelesshart.

Detailed information on IE/WSN-PA LINK can be found in the FI 01 catalogue Sec. 7 or www.siemens.com/wirelesshart.

Integration

Connecting to SIMATIC PCS 7

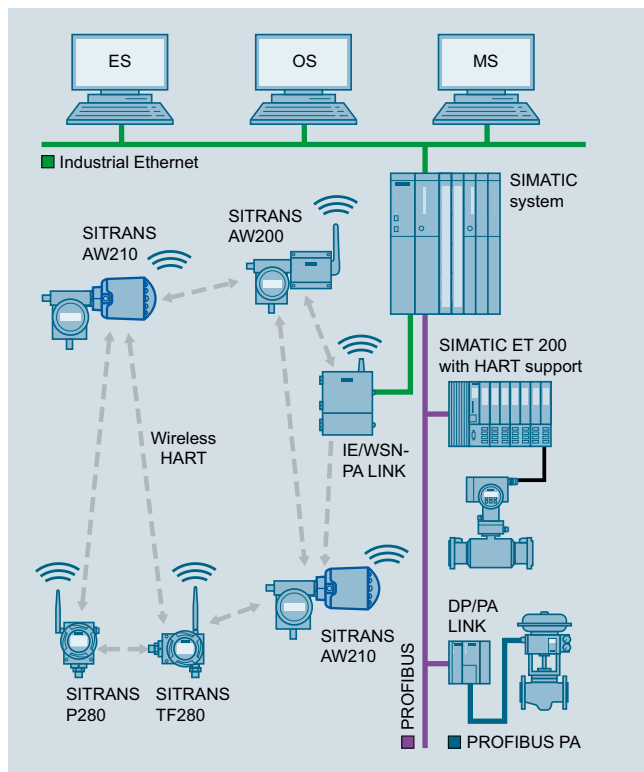
The integration of field devices in SIMATIC PCS 7 and other process control systems can be now done seamlessly and cost-effectively with wireless technology, especially in situations where high wiring costs may be expected. Of particular interest are measuring points which are to be added and for which no wiring is available.

Where larger distances between the IE/WSN-PA LINK and control systems need to be overcome, this connection can also be implemented on a wireless and cost-effective basis using the SCALANCE W series of products. Siemens WirelessHART devices operate with optimum coexistence to SCALANCE W family products.

Temperature Measurement

Transmitters for field mounting

SITRANS TF280 WirelessHART



Integration of a meshed network into SIMATIC PCS 7

Configuration

Configuration of the SITRANS TF280 transmitter may be carried out as follows:

- Initial commissioning for the SITRANS TF280 with SIMATIC PDM is generally carried out via a HART modem or the integrated local user interface, since the network ID and join Key must be set up on the device before it can be accepted and integrated into the WirelessHART network.
- Once it is integrated into the network, the device can be conveniently operated with the WirelessHART network or onsite with a HART modem or via the local user interface.

Technical specifications

The SITRANS TF280 can be mechanically installed in two ways:

- Direct at the measuring point with a M20x1.5 thread. A connection to other threads can be done via the adapter.
- Remotely from the Pt100 sensor, which is connected to the transmitter via a cable.

The data in the following table refer to the transmitter only excluding a connected sensor, except as noted otherwise.

Input	
Sensor	
• Sensor type	Pt100 as per IEC 751/DIN EN 60751 ¹⁾
• Connection	Two, three or four-wire system
• Measuring range	-200 ... +850 °C (-328 ... 1560 °F)
Cable length SITRANS TF280 and Pt100 sensor element	≤ 3 m
Measuring accuracy ²⁾	
Accuracy	< 0.04 % of the measuring range
Long-term drift	< 0.035 % of the measuring range in first year
Ambient temperature effect	max. 0.1 °C/10 K
Rated conditions	
Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	< 95%
Climatic class	4K4H in accordance with EN 60721-3-4 (stationary use at locations not protected against weather)
Degree of protection	IP65/NEMA 4
Max. permissible temperature at transmitter for directly mounted Pt100	80 °C (176 °F)
Design	
Enclosure	Die-cast aluminum
Shock resistance	in accordance with DIN EN 60068-2-29 / 03.95
Resistance to vibration	DIN EN 60068-2-6/12.07
Weight	
• without battery	1.5 kg (3.3 lb)
• with battery	1.6 kg (3.5 lb)
Dimensions (W x H x D)	See "Dimensional drawing"
Thread for cable gland/sensor connection	M20x1.5 other threads via adapter
Material of protective tubes and process connection (only for pre-mounted sensor pipe)	Stainless steel 1.4404 (AISI 316L, UNS S 31603, X2CrNiMo17-12-2)
Cable between transmitter and sensor element	≤ 3 m für two-, three- or four-wire connections Cable resistance < 1 Ω (setting range in mΩ 0...9999)
Sensor break	Recognized

Temperature Measurement

Transmitters for field mounting

SITRANS TF280 WirelessHART

Displays and controls		Selection and Ordering data		Article No.
Display (with illumination)		SITRANS TF280 WirelessHART Temperature transmitter		7MP1110 - 0A - 00
• Size of display	104 x 80 pixels	(Required battery not included with delivery, see accessories)		
• Number of digits	Adjustable	➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
• Number of spaces after comma	Adjustable			
Setting options	<ul style="list-style-type: none"> • on site with 3 push buttons • with SIMATIC PDM or HART Communicator 	Connections/cable entry		
		Cable gland M20x1.5 ¹⁾	▶	C
		Sensor pipe with Pt100, G½" male thread, pre-mounted and connected	▶	D
		Display		
		Digital display, visible	▶	1
		Enclosure		
		Die-cast aluminum	▶	1
		Explosion protection		
		Not included	▶	A
		Antenna		
		Variable, attached to device	▶	A
		Further designs		Order code
		Please add "-Z" to Article No. and specify Order code(s) and plain text.		
		Measuring point number (TAG Nr.) max. 16 digits entered in plain text Y15:		Y15
		Measuring point message max. 27 characters entered in plain text: Y16:		Y16
		Accessories		Article No.
		Lithium battery for SITRANS TF280/P280	▶	7MP1990-0AA00
		Mounting bracket, steel		7MF4997-1AC
		Mounting bracket, stainless steel	▶	7MF4997-1AJ
		Cover, die-cast aluminum, without window	▶	7MF4997-1BB
		Cover, die-cast aluminum, with window		7MF4997-1BE
		Thread adapter M20x1.5 (male thread) on ½-14 NPT (female thread)	▶	7MP1990-0BA00
		Thread adapter M20x1.5 (male thread) on G½ (female thread)	▶	7MP1990-0BB00
		IE/WSN-PA Link		see Sec. 7
		HART modem with USB interface	▶	7MF4997-1DB
		SIMATIC PDM		see Sec. 8

1) Pre-mounted Pt100: Class A (maximum MES: $0.15 + 0.002 \cdot |t|$ °C)

2) Calculation for errors:
 Probable total error = $\sqrt{\text{MES}^2 + \text{AET}^2 + \text{LTD}^2 + \text{ATE}^2}$
 Max. error = MES + AET + LTD + ATE
 |t|: Absolut value of measured temperature
 MES: Measurement error of sensor
 AET: Accuracy error transmitter
 LTD: Long term drift
 ATE: Ambient temperature drift

▶ Available ex stock.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

¹⁾ Please order sensor separately.

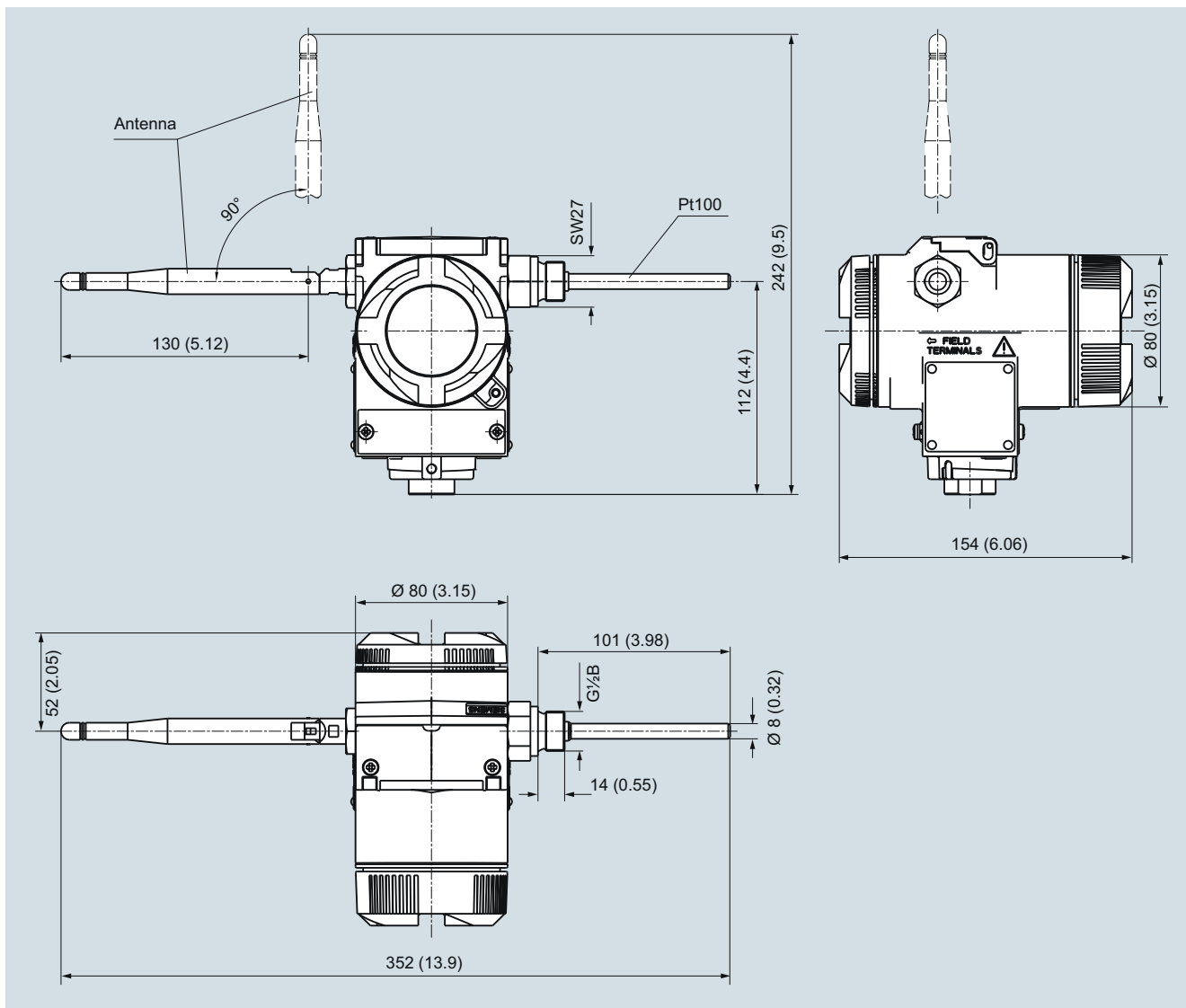
Temperature Measurement

Transmitters for field mounting

SITRANS TF280 WirelessHART

Dimensional drawings

2



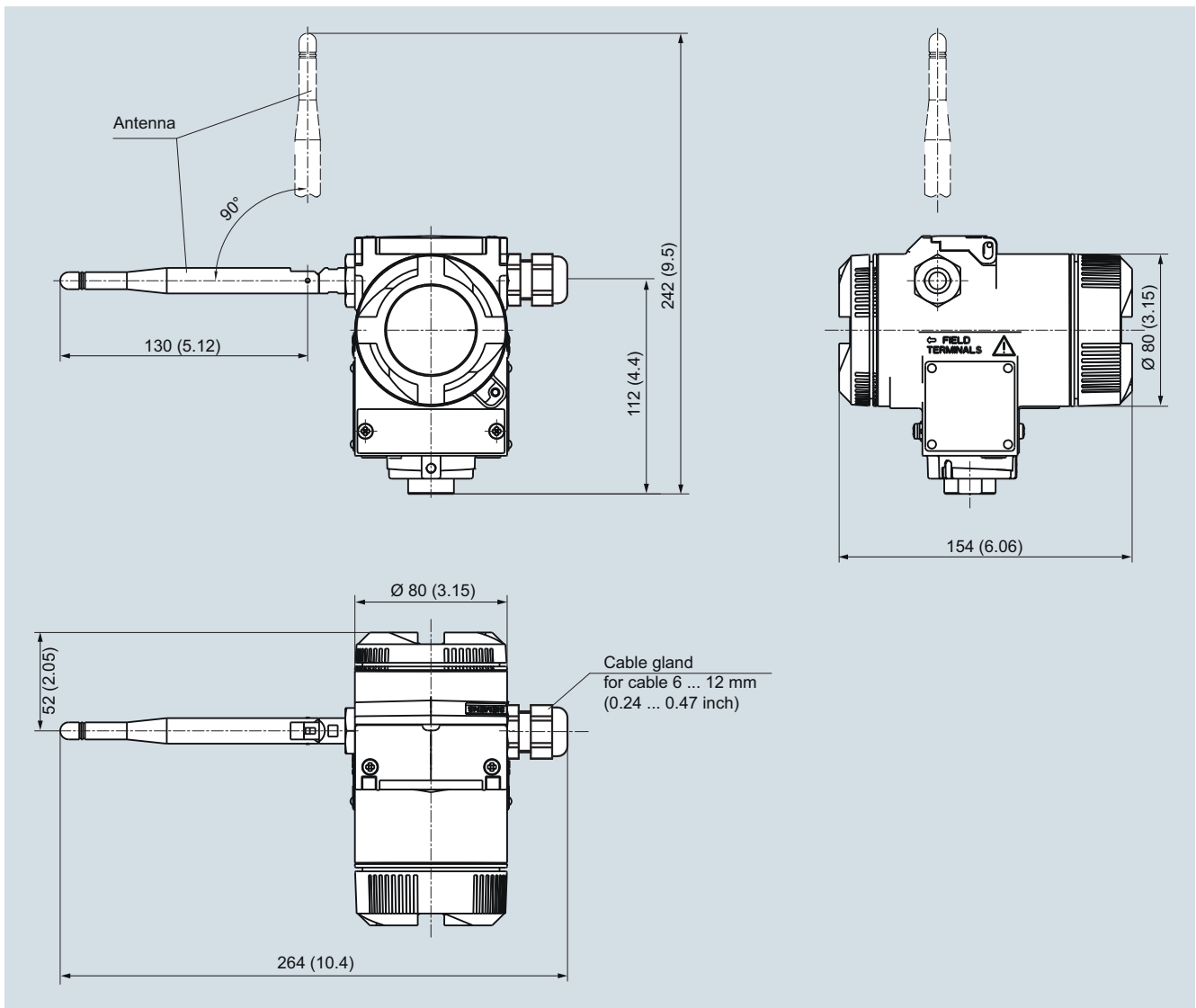
SITRANS TF280 WirelessHART temperature transmitter with Pt100, dimensions in mm (inch). Please see the dimensional drawing of the mounting bracket on page 1/171.

Temperature Measurement

Transmitters for field mounting

SITRANS TF280 WirelessHART

2



SITRANS TF280 WirelessHART temperature transmitter, dimensions in mm (inch)
Please see the dimensional drawing of the mounting bracket on page 1/171.

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Overview



Our field devices for heavy industrial use

- HART, Universal
- 4 to 20 mA, universal
- Field indicator for 4 to 20 mA signals

The temperature transmitter SITRANS TF works where others feel uncomfortable.

Benefits

- Universal use
 - as transmitter for resistance thermometer, thermocouple element, Ω or mV signal
 - as field indicator for any 4 to 20 mA signals
- Local sensing of measured values over digital display
- Rugged two-chamber enclosure in die-cast aluminium or stainless steel
- Degree of protection IP67
- Test terminals for direct read-out of the output signal without breaking the current loop
- Can be mounted elsewhere if the measuring point
 - is hard to access,
 - is subject to high temperatures,
 - is subject to vibrations from the system,
 - or if you want to avoid long neck tubes and/or protective tubes.
- Can be mounted directly on American-design sensors
- Wide range of approvals for use in potentially explosive atmospheres. "Intrinsically safe, non-sparking and flameproof" type of protections, for Europe and USA.
- SIL2 (with Order Code C20), SIL2/3 (with C23)

Application

SITRANS TF can be used everywhere where temperatures need to be measured under particularly adverse conditions, or where a convenient local display is ideal. Which is why users from all industries have opted for this field device. The rugged enclosure protects the electronics. The stainless steel model is almost completely resistant to sea water and other aggressive elements. The inner workings offer high measuring accuracy, universal input and a wide range of diagnostic options.

Function

Configuration

The communication capability over the HART protocol V 5.9 of the SITRANS TF with an integrated SITRANS TH300 permits parameterization using a PC or HART communicator (hand-held communicator). The SIMATIC PDM makes it easy.

Parameterization is carried out using a PC for SITRANS TF with the integrated and programmable SITRANS TK. Available for this purpose are a special modem and the software tool SIPROM T.

Mode of operation

Mode of operation of SITRANS TF as temperature transmitter

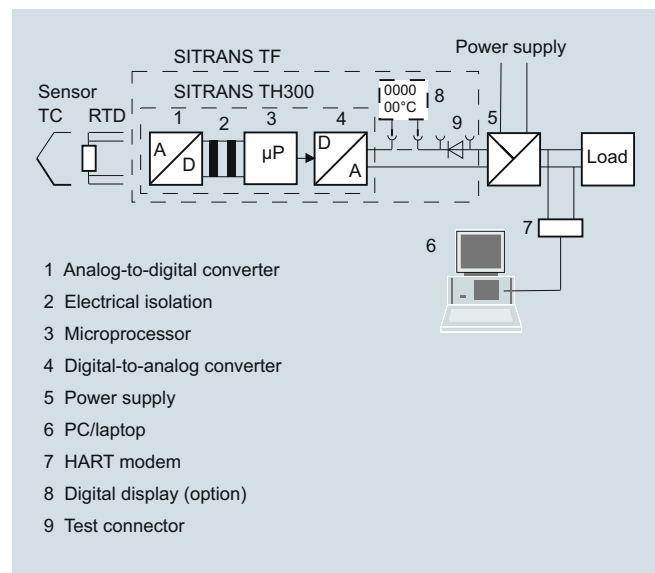
The sensor signal, whether resistance thermometer, thermocouple element or Ω or mV signal, is amplified and linearized. Sensor and output side are electrically isolated. An internal cold junction is integrated for measurements with thermocouple elements.

The device outputs a temperature-linear direct current of 4 to 20 mA. As well as the analog transmission of measured values from 4 to 20 mA, the HART version also supports digital communication for online diagnostics, measured value transmission and configuration.

SITRANS TF automatically detects when a sensor should be interrupted or is indicating a short-circuit. The practical test terminals allow direct measurement of 4 to 20 mA signals over an ammeter without interrupting the output current loop.

Mode of operation of SITRANS TF as field indicator

Any 4 to 20 mA signal can be applied to the generous terminal block. As well as a range of predefined measurement units, the adjustable indicator also supports the input of customized units. This means that any 4 to 20 mA signal can be represented as any type of unit, e.g. pressure, flow rate, filling level or temperature.



Mode of operation: SITRANS TF with integrated transmitter and digital display

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Technical specifications

Input

Resistance thermometer

Measured variable	Temperature
Sensor type	
• to IEC 60751	Pt25 ... Pt1000
• to JIS C 1604; a=0.00392 K-1	Pt25 ... Pt1000
• to IEC 60751	Ni25 ... Ni1000
Units	°C and °F
Connection	
• Normal connection	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system
• Generation of average value	Series or parallel connection of several resistance thermometers in a two-wire system for the generation of average temperatures or for adaptation to other device types
• Generation of difference	2 resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)
Interface	
• Two-wire system	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance)
• Three-wire system	No balancing required
• Four-wire system	No balancing required
Sensor current	≤ 0.45 mA
Response time	≤ 250 ms for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: ON)
Measuring range	parameterizable (see table "Digital measuring errors")
Min. measured span	10 °C (18 °F)
Characteristic curve	Temperature-linear or special characteristic

Resistance-based sensors

Measured variable	Actual resistance
Sensor type	Resistance-based, potentiometers
Units	Ω
Connection	
• Normal connection	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire system
• Generation of average value	2 resistance-based sensors in 2-wire system for generation of average value
• Generation of difference	2 resistance-based sensor in 2-wire system (R 1 – R 2 or R 2 – R 1)
Interface	
• Two-wire system	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance)
• Three-wire system	No balancing required
• Four-wire system	No balancing required
Sensor current	≤ 0.45 mA
Response time	≤ 250 ms for 1 sensor with open-circuit monitoring
Open-circuit monitoring	Can be switched off
Short-circuit monitoring	Can be switched off (value is adjustable)

Measuring range

Min. measured span

Characteristic curve

Thermocouples

Measured variable

Sensor type (thermocouples)

- Type B
- Type C
- Type D
- Type E
- Type J
- Type K
- Type L
- Type N
- Type R
- Type S
- Type T
- Type U

Units

Connection

- Normal connection
- Generation of average value
- Generation of difference

Response time

Open-circuit monitoring

Cold junction compensation

- Internal
- External
- External fixed

Measuring range

Min. measured span

Characteristic curve

mV sensor

Measured variable

Sensor type

Units

Response time

Open-circuit monitoring

Measuring range

Min. measured span

Overload capability of the input

Input resistance

Characteristic curve

parameterizable max. 0 ... 2200 Ω (see table "Digital measuring errors")

5 ... 25 Ω (see Table "Digital measuring errors")

Resistance-linear or special characteristic

Temperature

Pt30Rh-Pt6Rh to DIN IEC 584
W5 %-Re acc. to ASTM 988
W3 %-Re acc. to ASTM 988
NiCr-CuNi to DIN IEC 584
Fe-CuNi to DIN IEC 584
NiCr-Ni to DIN IEC 584
Fe-CuNi to DIN 43710
NiCrSi-NiSi to DIN IEC 584
Pt13Rh-Pt to DIN IEC 584
Pt10Rh-Pt to DIN IEC 584
Cu-CuNi to DIN IEC 584
Cu-CuNi to DIN 43710

°C or °F

1 thermocouple (TC)

2 thermocouples (TC)

2 thermocouples (TC)
(TC 1 – TC 2 or TC 2 – TC 1)

≤ 250 ms for 1 sensor with open-circuit monitoring

Can be switched off

With integrated Pt100 resistance thermometer

With external Pt100 IEC 60751 (2-wire or 3-wire connection)

Cold junction temperature can be set as fixed value

parameterizable (see table "Digital measuring errors")

Min. 40 ... 100 °C (72 ... 180 °F) (see table "Digital measuring errors")

Temperature-linear or special characteristic

DC voltage

DC voltage source (DC voltage source possible over an externally connected resistor)

mV

≤ 250 ms for 1 sensor with open-circuit monitoring

Can be switched off

-10 ... +70 mV
-100 ... +1100 mV

2 mV or 20 mV

-1.5 ... +3.5 V DC

≥ 1 M Ω

Voltage-linear or special characteristic

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Output		Auxiliary power	
Output signal	4 ... 20 mA, 2-wire	Without digital display	11 ... 35 V DC (30 V for Ex ib; 32 V for Ex ic and Ex nA)
Communication with SITRANS TH300	acc. to HART Rev. 5.9	With digital display	13.1 ... 5 V DC (30 V for Ex ib; 32 V for Ex ic and Ex nA)
Digital display		Electrically isolated	Between input and output
Digital display (optional)	In current loop	• Test voltage	$U_{\text{eff}} = 1 \text{ kV}$, 50 Hz, 1 min
Display	Max. 5 digits	Certificates and approvals	
Digit height	9 mm (0.35 inch)	Explosion protection ATEX	
Display range	-99 999 ... + 99 999	• "Intrinsic safety" type of protection	with digital display: II 2 (1) G EEx ia IIC T4 without digital display: II 2 (1) G EEx ia IIC T6
Units	any (max. 5 char.)	- EC type test certificate	ZELM 11 ATEX 0471 X
Setting: Zero point, full-scale value and unit	with 3 buttons	• "Operating equipment that is non-ignitable and has limited energy for zone 2" type of protection	II 3G EEx nAL IIC T6/T4
Load voltage	2.1 V	- EC type test certificate	ZELM 11 ATEX 0471 X
Measuring accuracy		• "Flame-proof enclosure" type of protection	II 2 G EEx d IIC T5/T6 II 1D Ex tD A20 IP65 T100 °C, T85 °C
Digital measuring errors	See table "Digital measuring errors"	- EC type test certificate	ZELM 11 ATEX 0472 X
Reference conditions		Explosion protection to FM	Certificate of Compliance 3017742
• Auxiliary power	24 V ± 1 %	• Identification (XP, DIP, NI, S)	• XP/II/BCD/T5 Ta = 85 °C (185 °F), T6 Ta = 50 °C (112 °F), Type 4X
• Load	500 Ω		• DIP/II, III/1/EFG/T5 Ta = 85 °C (185 °F), T6 Ta = 50 °C (112 °F), Type 4X
• Ambient temperature	23 °C (73.4 °F)		• NI/II/2/ABCD/T5 Ta = 85 °C (185 °F), T6 Ta = 50 °C (112 °F), Type 4X
• Warming-up time	> 5 min		• S/II, III/2/FG/T5 Ta = 85 °C (185 °F), T6 Ta = 50 °C (112 °F), Type 4X
Error in the analog output (digital/analog converter)	< 0.025 % of span	Other certificates	IECEX, GOST, INMETRO, NEPSI, KOSHA
Error due to internal cold junction	< 0.5 °C (0.9 °F)		
Influence of ambient temperature		Hardware and software requirements	
• Analog measuring error	0.02 % of span/10 °C (18 °F)	• For the parameterization software SIPROM T for SITRANS TF with TH200	PC with CD-ROM drive and USB
• Digital measuring errors		- Personal computer	Windows 98, NT, 2000, XP, 7 and Win 8
- with resistance thermometers	0.06 °C (0.11 °F)/10 °C (18 °F)	- PC operating system	
- with thermocouples	0.6 °C (1.1 °F)/10 °C (18 °F)	• For the parameterization software SIMATIC PDM for SITRANS TH300	See chapter 8 "Software", "SIMATIC PDM"
Auxiliary power effect	< 0.001 % of span/V	Communication	
Effect of load impedance	< 0.002 % of span/100 Ω	Load for HART connection	230 ... 1100 Ω
Long-term drift		• Two-core shielded	≤ 3.0 km (1.86 mi)
• In the first month	< 0.02 % of span	• Multi-core shielded	≤ 1.5 km (0.93 mi)
• After one year	< 0.3 % of span	Protocol	HART protocol, version 5.9
• After 5 years	< 0.4 % of span	Factory setting (transmitter):	
Conditions of use			• Pt100 (IEC 751) with 3-wire circuit
<u>Ambient conditions</u>			• Measuring range: 0 ... 100 °C (32 ... 212 °F)
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)		• Error signal in the event of sensor breakage: 22.8 mA
Condensation	Permissible		• Sensor offset: 0 °C (0 °F)
Electromagnetic compatibility	According to EN 61326 and NAMUR NE21		• Damping 0.0 s
Degree of protection to EN 60529	IP67	Construction	
Construction		Weight	Approx. 1.5 kg (3.3 lb) without options
		Dimensions	See "Dimensional drawings"
		Enclosure material	Die-cast aluminum, low in copper, GD-AlSi 12 or stainless steel, polyester-based lacquer, stainless steel rating plate
		Electrical connection, sensor connection	Screw terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland
		Mounting bracket (optional)	Steel, galvanized and chrome-plated or stainless steel

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Digital measuring errors

Resistance thermometer

Input	Measuring range °C / (°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
to IEC 60751					
Pt25	-200 ... +850 (-328 ... +1562)	10	(18)	0.3	(0.54)
Pt50	-200 ... +850 (-328 ... +1562)	10	(18)	0.15	(0.27)
Pt100 ... Pt200	-200 ... +850 (-328 ... +1562)	10	(18)	0.1	(0.18)
Pt500	-200 ... +850 (-328 ... +1562)	10	(18)	0.15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0.15	(0.27)

to JIS C1604-81

Pt25	-200 ... +649 (-328 ... +1200)	10	(18)	0.3	(0.54)
Pt50	-200 ... +649 (-328 ... +1200)	10	(18)	0.15	(0.27)
Pt100 ... Pt200	-200 ... +649 (-328 ... +1200)	10	(18)	0.1	(0.18)
Pt500	-200 ... +649 (-328 ... +1200)	10	(18)	0.15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0.15	(0.27)
Ni 25 to Ni1000	-60 ... +250 (-76 ... +482)	10	(18)	0.1	(0.18)

Resistance-based sensors

Input	Measuring range Ω	Min. mea- sured span Ω	Digital accuracy Ω
Resistance	0 ... 2200	25	0.25

Thermocouples

Input	Measuring range °C / (°F)	Min. mea- sured span		Digital accuracy	
		°C	(°F)	°C	(°F)
Type B	0 ... 1820 (32 ... 3308)	100	(180)	2 ¹⁾	(3.6) ¹⁾
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.8) ²⁾
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.8) ²⁾
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.8)
Type J	-210 ... +1200 (-346 ... +2192)	50	(90)	1	(1.8)
Type K	-200 ... +1370 (-328 ... +2498)	50	(90)	1	(1.8)
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.8)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.8)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type T	-20 ... +400 (-328 ... +752)	40	(72)	1	(1.8)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.6)

¹⁾ The digital accuracy in the range 0 to 300 °C (32 to 572 °F) is 3 °C (5.4 °F).

²⁾ The digital accuracy in the range 1750 to 2300 °C (3182 to 4172 °F) is 2 °C (3.6 °F).

mV sensor

Input	Measuring span mV	Min. mea- sured span mV	Digital accuracy μV
mV sensor	-100 ... +1100	20	400

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0.025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Selection and Ordering data	Article No.	Selection and Ordering data	Order Code
Temperature transmitter in field housing Two-wire system 4 ... 20 mA, with electrical isolation, with documentation on MiniDVD ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7NG313	Customer-specific programming Add "-Z" to Article No. and specify Order code(s)	
Integrated transmitter SITRANS TH200, programmable <ul style="list-style-type: none"> Without Ex protection With Ex ia With Ex nAL for zone 2 Total device SITRANS TF Ex d¹⁾ Total device SITRANS TF according to FM (XP, DIP, NI, S)¹⁾ SITRANS TH300, communication capability according to HART V 5.9 <ul style="list-style-type: none"> Without Ex-protection With Ex ia With Ex nAL for zone 2 Total device SITRANS TF Ex d¹⁾ Total device SITRANS TF according to FM (XP, DIP, NI, S)¹⁾ 	5 0 5 1 5 2 5 4 5 5 6 0 6 1 6 2 6 4 6 5	Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F Measuring point no. (TAG), max. 8 characters Meas. point descriptor, max. 16 characters Meas. point message, max. 32 characters Only inscription on measuring point label: specify in plain text: Measuring range Pt100 (IEC) 2-wire, R _L = 0 Ω Pt100 (IEC) 3-wire Pt100 (IEC) 4-wire Thermocouple type B Thermocouple type C (W5) Thermocouple type D (W3) Thermocouple type E Thermocouple type J Thermocouple type K Thermocouple type L Thermocouple type N Thermocouple type R Thermocouple type S Thermocouple type T Thermocouple type U With TC: CJC external (Pt100, 3-wire) With TC: CJC external with fixed value, specify in plain text Special differing customer-specific programming, specify in plain text Fail-safe value 3.6 mA (instead of 22.8 mA)	Y01 ²⁾ Y17 ³⁾ Y23 ⁴⁾ Y24 ⁴⁾ Y22 ⁴⁾ U02 ⁵⁾ U03 ⁵⁾ U04 ⁵⁾ U20 ⁵⁾⁶⁾ U21 ⁵⁾⁶⁾ U22 ⁵⁾⁶⁾ U23 ⁵⁾⁶⁾ U24 ⁵⁾⁶⁾ U25 ⁵⁾⁶⁾ U26 ⁵⁾⁶⁾ U27 ⁵⁾⁶⁾ U28 ⁵⁾⁶⁾ U29 ⁵⁾⁶⁾ U30 ⁵⁾⁶⁾ U31 ⁵⁾⁶⁾ U41 Y50 Y09 ⁷⁾ U36 ³⁾
Enclosure Die-cast aluminium Stainless steel precision casting	A E		
Connections/cable inlet Screwed glands M20x1.5 Screwed glands ½-14 NPT	B C		
Digital indicator Without With	0 1		
Mounting bracket and securing parts Without Made of steel Made of stainless steel	0 1 2		
Further designs Please add "-Z" to Article No. and specify Order code(s) and plain text.	Order code		
Test protocol (5 measuring points)	C11		
Functional safety SIL2	C20		
Functional safety SIL2/3	C23		
Explosion protection <ul style="list-style-type: none"> Explosion protection Ex ia to INMETRO (Brazil) (only with 7NG313.-1...) Explosion protection Ex d to INMETRO (Brazil) (only with 7NG313.-4...) Explosion protection Ex nA to INMETRO (Brazil) (only with 7NG313.-2...) Explosion protection Ex i to NEPSI (China) (only with 7NG313.-1...) Explosion protection Ex d to NEPSI (China) (only with 7NG313.-4...) Explosion protection Ex nA to NEPSI (China) (only with 7NG313.-2...) Explosion protection Ex d to KOSHA (Korea) (only with 7NG313.-4...) 	E25 E26 E27		
<ul style="list-style-type: none"> Two coats of lacquer on casing and cover (PU on epoxy) 	G10		
<ul style="list-style-type: none"> Transient protection 	J01		
<ul style="list-style-type: none"> Cable gland CAPRI 1/2 NPT ADE 4F, nickel-plated brass (CAPRI 848694 and 810634) included 	D57		
<ul style="list-style-type: none"> Cable gland 1/2 NPT ADE 1F, cable diam. 6 ... 12 (CAPRI 818694 and 810534) included 	D58		
<ul style="list-style-type: none"> Cable gland 1/2 NPT ADE 4F, stainless steel (CAPRI 848699 and 810634) included 	D59		
<ul style="list-style-type: none"> Cable gland 1/2 NPT ADE 1F, cable diam. 4 ... 8.5 (CAPRI 818674 and 810534) included 	D60		
		Supply units see Chapter "Supplementary Components".	
		1) Without cable gland. 2) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here. 3) For this selection, Y01 or Y09 must also be selected. 4) If only Y22, Y23 or Y24 are ordered and the label <u>only</u> has to be on the tag plate, Y01 does not have to be specified. 5) For this selection, Y01 must also be selected. 6) Internal cold junction compensation is selected as the default for TC. 7) For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.	

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Selection and Ordering data	Article No.
<i>Accessories</i>	
Modem for SITRANS TH100, TH200, TR200 and TF with TH200 incl. parameterization software T with USB interface	7NG3092-8KU
MiniDVD for temperature measuring instruments with documentation in German, English, French, Spanish, Italian and Portuguese, and parameterization software SIPROM T (included in delivery with SITRANS TF)	A5E00364512
HART modem With USB interface	7MF4997-1DB
SIMATIC PDM parameterization software also for SITRANS TH300	see chapter 8
Mounting bracket and securing parts	
Made of steel for 7NG313.-..B..	7MF4997-1AC
Made of steel for 7NG313.-..C..	7MF4997-1AB
Made of stainless steel for 7NG313.-..B..	7MF4997-1AJ
Made of stainless steel for 7NG313.-..C..	7MF4997-1AH
Digital indicator¹⁾	7MF4997-1BS
Connection board	A5E02226423

► Available ex stock.

Supply units see Chapter "Supplementary Components".

¹⁾ It is not possible to upgrade devices with Ex protection

Ordering example 1:

7NG3135-0AB11-Z Y01+Y23+U03

Y01: -10 ... +100 °C

Y23: TICA1234HEAT

Ordering example 2:

7NG3136-0AC11-Z Y01+Y23+Y24+U25

Y01: -10 ... +100 °C

Y23: TICA 1234 ABC

Y24: HEATING BOILER 56789

Factory setting (transmitter):

- Pt100 (IEC 751) with three-wire circuit
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Temperature Measurement

Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Selection and Ordering data	Article No.
SITRANS TF field indicator for 4 ... 20 mA signals, with documentation on MiniDVD	7NG3130 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Without Ex-protection	0 1
With Ex ia	1 1
With Ex nAL for zone 2	2 1
Total device SITRANS TF Ex d ¹⁾	4 1
Total device SITRANS TF according to FM (XP, DIP, NI, S) ¹⁾	5 1
Enclosure	
Die-cast aluminium	A
Stainless steel precision casting	E
Connections/cable inlet	
Screwed glands M20x1.5	B
Screwed glands 1/2-14 NPT	C
Digital indicator	
With	1
Mounting bracket and securing parts	
Without	0
Made of steel	1
Made of stainless steel	2
Further designs	Order code
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Test protocol (5 measuring points)	C11
Explosion protection	
• Explosion protection Ex ia to INMETRO (Brazil) (only with 7NG313.-1...)	E25
• Explosion protection Ex d to INMETRO (Brazil) (only with 7NG313.-4...)	E26
• Explosion protection Ex nA to INMETRO (Brazil) (only with 7NG313.-2...)	E27
• Explosion protection Ex i to NEPSI (China) (only with 7NG313.-1...)	E55
• Explosion protection Ex d to NEPSI (China) (only with 7NG313.-4...)	E56
• Explosion protection Ex nA to NEPSI (China) (only with 7NG313.-2...)	E57
• Explosion protection Ex d to KOSHA (Korea) (only with 7NG313.-4...)	E70
• Two coats of lacquer on casing and cover (PU on epoxy)	G10
• Transient protection	J01
• Cable gland CAPRI 1/2 NPT ADE 4F, nickel-plated brass (CAPRI 848694 and 810634) included	D57
• Cable gland 1/2 NPT ADE 1F, cable diam. 6 ... 12 (CAPRI 818694 and 810534) included	D58
• Cable gland 1/2 NPT ADE 4F, stainless steel (CAPRI 848699 and 810634) included	D59
• Cable gland 1/2 NPT ADE 1F, cable diam. 4 ... 8.5 (CAPRI 818674 and 810534) included	D60

Selection and Ordering data	Order Code
Customer-specific programming Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: ... to ... °C, °F	Y01 ²⁾
Only inscription on TAG plate: specify in plain text: Measuring range	Y22 ³⁾
Only inscription on TAG plate: Measuring point descriptor, max. 16 characters	Y23 ³⁾
Only inscription on TAG plate: Measuring point message, max. 27 characters	Y24 ³⁾
Special differing customer-specific programming, specify in plain text	Y09 ⁴⁾
Supply units see Chapter "Supplementary Components".	
1) Without cable gland.	
2) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.	
3) If only Y22, Y23 or Y24 are ordered and the label <u>only</u> has to be on the tag plate, Y01 does not have to be specified.	
4) For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.	

Selection and Ordering data	Article No.
Accessories	
MiniDVD for temperature measuring instruments ▶	A5E00364512
with documentation in German, English, French, Spanish, Italian and Portuguese, and parameterization software SIPROM T (included in delivery with SITRANS TF)	
Mounting bracket and securing parts	
Made of steel for 7NG313.-.B..	7MF4997-1AC
Made of steel for 7NG313.-.C..	7MF4997-1AB
Made of stainless steel for 7NG313.-.B.. ▶	7MF4997-1AJ
Made of stainless steel for 7NG313.-.C..	7MF4997-1AH
Digital indicator¹⁾	7MF4997-1BS
Connection board	A5E02226423
▶ Available ex stock.	

¹⁾ It is not possible to upgrade devices with Ex protection

Ordering example 1:

7NG3130-0AB10-Z Y01+Y23

Y01: -5...100 °C

Y23: TICA1234HEAT

Ordering example 2:

7NG3130-0AC10-Z Y01+Y23+Y24

Y01: 0 ... 20 BAR

Y23: PICA 1234 ABC

Y29: HEATING BOILER 67890

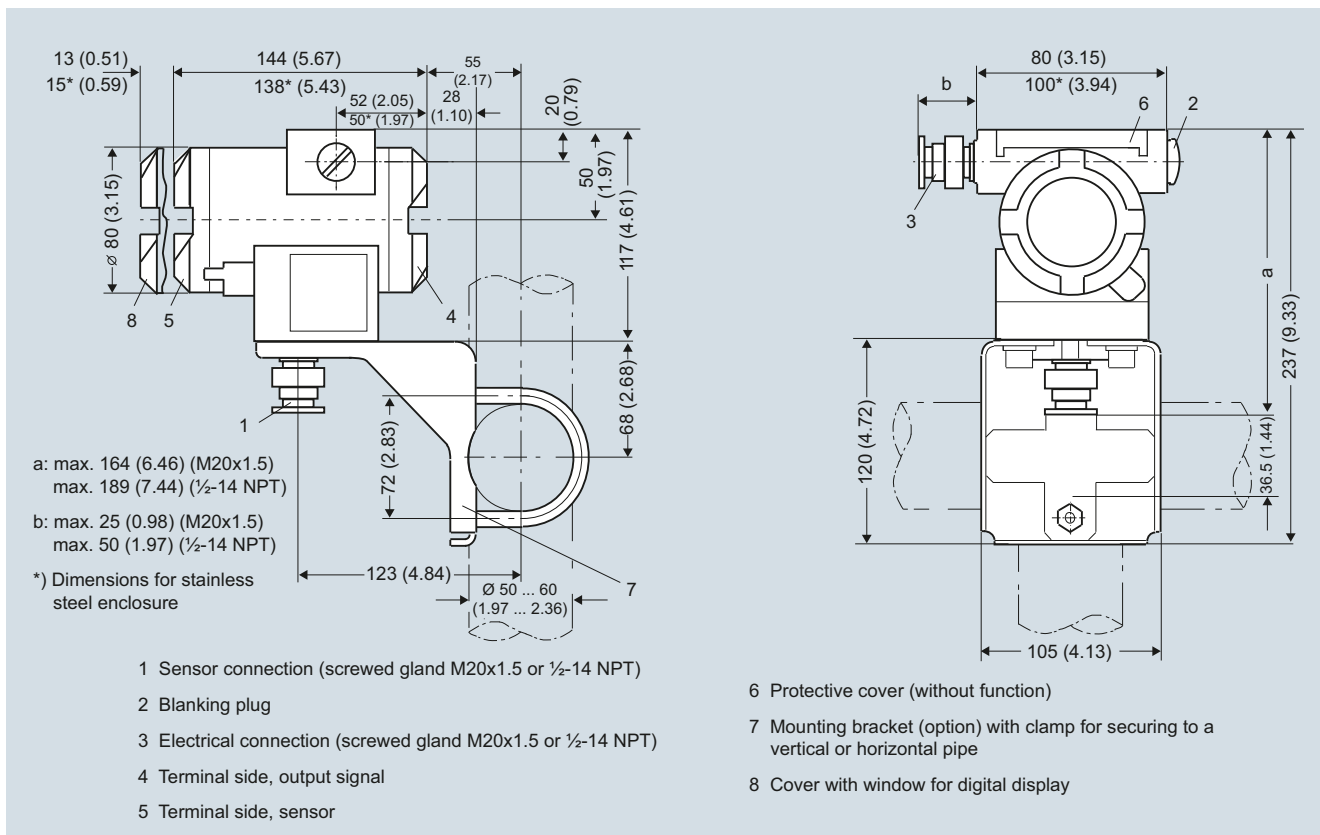
Factory setting (field indicator):

4 ... 20 mA

Temperature Measurement Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Dimensional drawings



SITRANS TF, dimensions in mm (inches)

Temperature Measurement

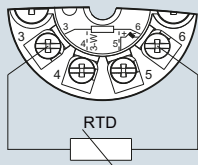
Transmitter for field mounting/field indicator

SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

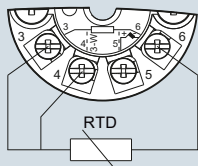
Schematics

2

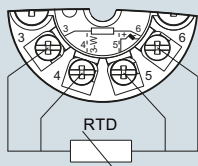
Resistance thermometer



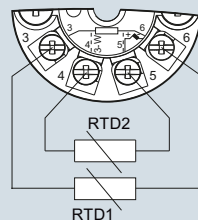
Two-wire system ¹⁾



Three-wire system



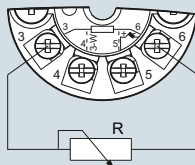
Four-wire system



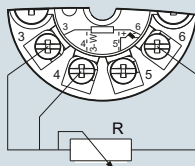
Generation of average value / difference ¹⁾

¹⁾ Programmable line resistance for the purpose of correction.

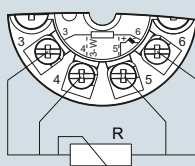
Resistance



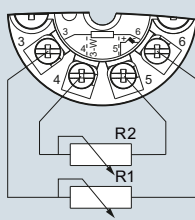
Two-wire system ¹⁾



Three-wire system

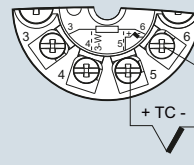


Four-wire system

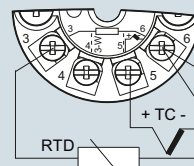


Generation of average value / difference ¹⁾

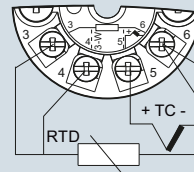
Thermocouple



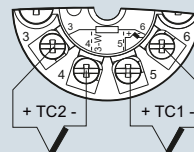
Cold junction compensation
Internal/fixed value



Cold junction compensation with
external Pt100 in two-wire system ¹⁾

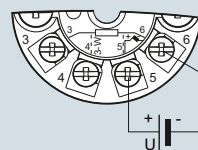


Cold junction compensation with
external Pt100 in three-wire system

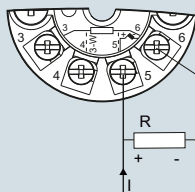


Generation of average value / difference
with internal cold junction compensation

Voltage measurement



Current measurement



SITRANS TF, sensor connection assignment

Overview



Our field devices for heavy industrial use

- FOUNDATION fieldbus
- PROFIBUS PA

The SITRANS TF temperature transmitter works where others can't cope.

Benefits

- For universal use as a transmitter for resistance thermometers, thermocouple elements, Ω or mV signals
- Rugged two-chamber enclosure in die-cast aluminium or stainless steel
- Degree of protection IP67
- Can be mounted elsewhere if the measuring point
 - is hard to access,
 - is subject to high temperatures,
 - is subject to vibrations from the system,
 - or if you want to avoid long neck tubes and/or protective tubes.
- Can be mounted directly on American-design sensors
- Wide range of approvals for use in potentially explosive atmospheres. "Intrinsically safe, non-sparking and flameproof" type of protection, for Europe and USA

Application

The SITRANS TF can be used everywhere where temperatures need to be measured under particularly harsh conditions. Which is why users from all industries have opted for this field device.

The rugged enclosure protects the electronics. The stainless steel model is almost completely resistant to sea water and other aggressive elements.

The inner workings offer high measuring accuracy, universal input and a wide range of diagnostic options.

Function

Features

- Polarity-neutral bus connection
- 24-bit analog-digital converter for high resolution
- Electrically isolated
- Version for use in hazardous areas
- Special characteristic
- Sensor redundancy

Transmitter with PROFIBUS PA communication

- Function blocks: 2 x analog

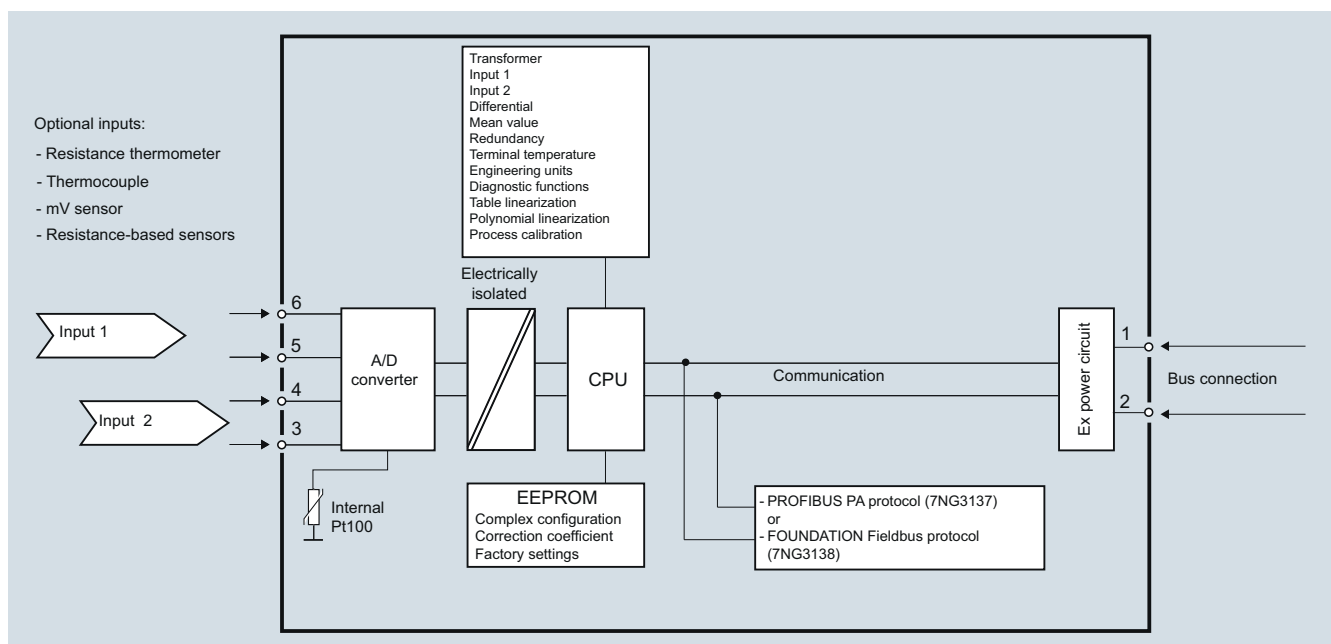
Transmitter with FOUNDATION fieldbus communication

- Function blocks: 2 x analog and 1 x PID
- Functionality: Basic or LAS

Mode of operation

The following function diagram explains the mode of operation of the transmitter.

The only difference between the two versions of the SITRANS TF (7NG3137-... and 7NG3138-...) is the type of field bus protocol used (PROFIBUS PA or FOUNDATION fieldbus).



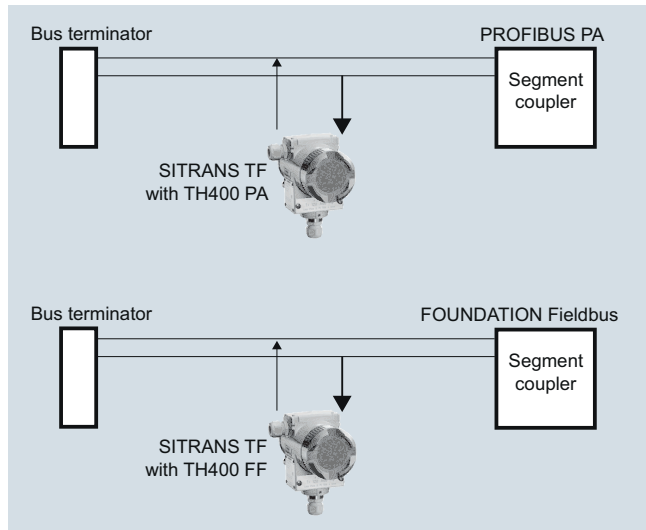
SITRANS TF with TH400, function diagram

Temperature Measurement

Transmitters for field mounting

SITRANS TF fieldbus transmitter

System communication



SITRANS TF with TH400, communication interface

Technical specifications

Input

Analog/digital conversion

- Measurement rate < 50 ms
- Resolution 24-bit

Resistance thermometer

Pt25 ... 1000 to IEC 60751/JIS C 1604

- Measuring range -200 ... +850 °C (-328 ... +1562 °F)
- Ni25 ... 1000 to DIN 43760
- Measuring range -60 ... +250 °C (-76 ... +482 °F)

Cu10 ... 1000, $\alpha = 0.00427$

- Measuring range -50 ... +200 °C (-58 ... +392 °F)

Line resistance per sensor cable Max. 50 Ω

Sensor current Nominal 0.2 mA

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 15 Ω

Resistance-based sensors

Measuring range 0 ... 10 k Ω
 Line resistance per sensor cable Max. 50 Ω
 Sensor current Nominal 0.2 mA

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 15 Ω

Thermocouple

to IEC 584

- Type B Measuring range 400 ... 1820 °C (752 ... 3308 °F)
- Type E -100 ... +1000 °C (-148 ... +1832 °F)
- Type J -100 ... +1000 °C (-148 ... +1832 °F)
- Type K -100 ... +1200 °C (-148 ... +2192 °F)
- Type N -180 ... +1300 °C (-292 ... +2372 °F)

- Type R -50 ... +1760 °C (-58 ... +3200 °F)
 - Type S -50 ... +1760 °C (-58 ... +3200 °F)
 - Type T -200 ... +400 °C (-328 ... +752 °F)
- to DIN 43710
- Type L -200 ... +900 °C (-328 ... +1652 °F)
 - Type U -200 ... +600 °C (-328 ... +1112 °F)

to ASTM E988-90

- Type W3 0 ... 2300 °C (32 ... 4172 °F)
- Type W5 0 ... 2300 °C (32 ... 4172 °F)

External cold junction compensation -40 ... +135 °C (-40 ... +275 °F)

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 3 mV
- Sensor current in the event of open-circuit monitoring 4 μ A

mV sensor - voltage input

Measuring range -800 ... +800 mV

Input resistance 10 M Ω

Output

Filter time (programmable) 0 ... 60 s

Update time < 400 ms

Measuring accuracy

Accuracy is defined as the higher value of general values and basic values.

General values

Type of input	Absolute accuracy	Temperature coefficient
All	$\leq \pm 0.05$ % of the measured value	$\leq \pm 0.002$ % of the measured value/°C

Basic values

Type of input	Basic accuracy	Temperature coefficient
Pt100 and Pt1000	$\leq \pm 0.1$ °C	$\leq \pm 0.002$ °C/°C
Ni100	$\leq \pm 0.15$ °C	$\leq \pm 0.002$ °C/°C
Cu10	$\leq \pm 1.3$ °C	$\leq \pm 0.02$ °C/°C
Resistance-based sensors	$\leq \pm 0.05$ Ω	$\leq \pm 0.002$ Ω /°C
Voltage source	$\leq \pm 10$ μ V	$\leq \pm 0.2$ μ V/°C
Thermocouple, type: E, J, K, L, N, T, U	$\leq \pm 0.5$ °C	$\leq \pm 0.01$ °C/°C
Thermocouple, type: B, R, S, W3, W5	$\leq \pm 1$ °C	$\leq \pm 0.025$ °C/°C
Cold junction compensation	$\leq \pm 0.5$ °C	

Reference conditions

Warming-up time	30 s
Signal-to-noise ratio	Min. 60 dB
Calibration condition	20 ... 28 °C (68 ... 82 °F)

Conditions of use		Communication	
<u>Ambient conditions</u>		<u>Parameterization interface</u>	
Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	• PROFIBUS PA connection	
Permissible storage temperature	-40 ... +85 °C (-40 ... +185 °F)	- Protocol	A&D profile, Version 3.0
Relative humidity	≤ 98 %, with condensation	- Protocol	EN 50170 Volume 2
<u>Insulation resistance</u>		- Address (for delivery)	126
• Test voltage	500 V AC for 60 s	- Function blocks	2 x analog
• Continuous operation	50 V AC/75 V DC	• FOUNDATION fieldbus connection	
<u>Electromagnetic compatibility</u>		- Protocol	FF protocol
NAMUR	NE21	- Protocol	FF design specifications
EMC 2004/108/EC Emission and Noise Immunity	EN 61326-1, EN 61326-2-5	- Functionality	Basic or LAS
Construction		- Version	ITK 4.6
Weight	Approx. 1.5 kg (3.3 lb) without options	- Function blocks	2 x analog and 1 x PID
Dimensions	See "Dimensional drawings"	Factory setting	
Enclosure materials	<ul style="list-style-type: none"> Die-cast aluminum, low in copper, GD-AISI 12 or stainless steel Polyester-based lacquer for GD AISI 12 enclosure Stainless steel rating plate 	<u>for SITRANS TH400 PA</u>	
Electrical connection, sensor connection	<ul style="list-style-type: none"> screw terminals Cable inlet via M20 x 1.5 or ½ -14 NPT screwed gland Bus connection with M12 plug (optional) 	Sensor	Pt100 (IEC)
Mounting bracket (optional)	Steel, galvanized and chrome-plated or stainless steel	Type of connection	3-wire circuit
Degree of protection	IP67 to EN 60529	Unit	°C
Auxiliary power		Failure mode	Last valid value
Power supply		Filter time	0 s
• Standard, Ex "d", Ex "nA", Ex "nL", XP, NI	10.0 ... 32 V DC	PA address	126
• Ex "ia", Ex "ib"	10.0 ... 30 V DC	PROFIBUS Ident No.	Manufacturer-specific
• In FISCO/FNICO installations	10.0 ... 17.5 V DC	<u>for SITRANS TH400 FF</u>	
Power consumption	< 11 mA	Sensor	Pt100 (IEC)
Max. increase in power consumption in the event of a fault	< 7 mA	Type of connection	3-wire circuit
Certificates and approvals		Unit	°C
Explosion protection ATEX		Failure mode	Last valid value
EC type test certificate	ZELM 11 ATEX 0471 X	Filter time	0 s
• Type of protection "intrinsic safety i" (version: 7NG313x-1xxxx)	II 2(1) G Ex ia IIC T4/T6	Node address	22
Conformity statement	ZELM 11 ATEX 0471 X		
• "Operating equipment that is non-ignitable and has limited energy" type of protection (version: 7NG313x-2xxxx)	II 3 G Ex nA [nL] IIC T4/T6 II 3 G Ex nL IIC T4/T6		
EC type test certificate	ZELM 11 ATEX 0472 X		
• "Flame-proof enclosure" type of protection (version: 7NG313x-4xxxx)	II 2 G Ex d IIC T5/T6 II 1D Ex tD A20 IP65 T100 °C, T85 °C		
Explosion protection: FM for USA			
• FM approval	FM 3017742		
• Type of protection XP, DIP, NI and S (version 7NG313x-5xxxx)	<ul style="list-style-type: none"> XP / I / 1 / BCD / T5,T6; Type 4X DIP / II, III / 1 / EFG / T5,T6; Type 4X NI / I / 2 / ABCD / T5,T6; Type 4X S / II, III / 2 / FG T5,T6; Type 4X 		
Other certificates	GOST, INMETRO, NEPSI, KOSHA		

Temperature Measurement

Transmitters for field mounting

SITRANS TF fieldbus transmitter

Selection and Ordering data

Article No.

Temperature transmitter in field enclosure

with fieldbus communication and electrical isolation, with documentation on MiniDVD

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Integrated transmitter

SITRANS TH400 with PROFIBUS PA

- Without Ex protection
- With Ex ia (ATEX)
- With Ex nAL for zone 2 (ATEX)
- Total device SITRANS TF Ex d¹⁾
- Total device SITRANS TF according to FM (XP, DIP, NI, S)¹⁾

SITRANS TH400, with FOUNDATION fieldbus

- Without Ex protection
- With Ex ia (ATEX)
- With Ex nAL for zone 2 (ATEX)
- Total device SITRANS TF Ex d¹⁾
- Total device SITRANS TF according to FM (XP, DIP, NI, S)¹⁾

Enclosure

Die-cast aluminium

Stainless steel precision casting

Connections/cable inlet

Screwed glands M20x1.5

Screwed glands 1/2-14 NPT

Mounting bracket and fastening parts

None

Made of steel

Stainless steel

Further designs

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Test report (5 measuring points)

Bus connection

- M12 plug (metal), without mating connector
- M12 plug (metal), with mating connector

Explosion protection

- Explosion protection Ex ia to INMETRO (Brazil) (only with 7NG313.-1....)
- Explosion protection Ex d to INMETRO (Brazil) (only with 7NG313.-4....)
- Explosion protection Ex nA to INMETRO (Brazil) (only with 7NG313.-2...)
- Explosion protection Ex i to NEPSI (China) (only with 7NG313.-1....)
- Explosion protection Ex d to NEPSI (China) (only with 7NG313.-4....)
- Explosion protection Ex nA to NEPSI (China) (only with 7NG313.-2...)
- Explosion protection Ex d to KOSHA (Korea) (only with 7NG313.-4....)
- Two coats of lacquer on casing and cover (PU on epoxy)
- Transient protection
- Cable gland CAPRI 1/2 NPT ADE 4F, nickel-plated brass (CAPRI 848694 and 810634) included
- Cable gland 1/2 NPT ADE 1F, cable diam. 6 ... 12 (CAPRI 818694 and 810534) included
- Cable gland 1/2 NPT ADE 4F, stainless steel (CAPRI 848699 and 810634) included
- Cable gland 1/2 NPT ADE 1F, cable diam. 4 ... 8.5 (CAPRI 818674 and 810534) included

Article No.	Order code
7 NG 3 1 3 - - - 0 0	
7 0	
7 1	
7 2	
7 4	
7 5	
8 0	
8 1	
8 2	
8 4	
8 5	
	A
	E
	B
	C
	0
	1
	2
	C11
	M00 ²⁾
	M01 ²⁾
	E25
	E26
	E27
	E55
	E56
	E57
	E70
	G10
	J01
	D57
	D58
	D59
	D60

Selection and Ordering data

Order Code.

Customer-specific programming

Add "-Z" to Article No. and specify Order code(s)

Measuring range to be set

Specify in plain text (max. 5 digits):

Y01: ... to ... °C, °F

Meas. point no. (TAG), max. 32 characters

Meas. point descriptor, max. 32 characters

Meas. point message, max. 32 characters

Bus address, specify in plain text

Pt100 (IEC) 2-wire, R_L = 0 Ω

Pt100 (IEC) 3-wire

Pt100 (IEC) 4-wire

Thermocouple type B

Thermocouple type C (W5)

Thermocouple type D (W3)

Thermocouple type E

Thermocouple type J

Thermocouple type K

Thermocouple type L

Thermocouple type N

Thermocouple type R

Thermocouple type S

Thermocouple type T

Thermocouple type U

With TC: CJC: external (Pt100, 3-wire)

With TC: CJC: external with fixed value, specify in plain text

Special differing customer-specific programming, specify in plain text

¹⁾ Without cable gland

²⁾ Not available for explosion protection Ex d or XP.

³⁾ For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.

⁴⁾ If only Y15, Y23 or Y25 are ordered and the label only has to be on the tag plate, Y01 does not have to be specified.

⁵⁾ For this selection, Y01 or Y09 must also be selected.

⁶⁾ For this selection, Y01 must also be selected.

⁷⁾ Internal cold junction compensation is selected as the default for TC.

⁸⁾ For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Y01³⁾Y15⁴⁾Y23⁴⁾Y24⁵⁾Y25⁴⁾U02⁶⁾U03⁶⁾U04⁶⁾U20⁶⁾⁷⁾U21⁶⁾⁷⁾U22⁶⁾⁷⁾U23⁶⁾⁷⁾U24⁶⁾⁷⁾U25⁶⁾⁷⁾U26⁶⁾⁷⁾U27⁶⁾⁷⁾U28⁶⁾⁷⁾U29⁶⁾⁷⁾U30⁶⁾⁷⁾U31⁶⁾⁷⁾

U41

Y50

Y09⁸⁾

Selection and Ordering data	Article No.
Accessories	
MiniDVD for temperature measuring instruments ▶ with documentation in German, English, French, Spanish, Italian and Portuguese, and parameterization software SIPROM T (included in delivery with SITRANS TF)	A5E00364512
SIMATIC PDM parameterization software also for SITRANS TF with TH400 PA	see Sec. 8
Mounting bracket and fastening parts	
Made of steel for 7NG313.-..B..	7MF4997-1AC
Made of steel for 7NG313.-..C..	7MF4997-1AB
Made of stainless steel for 7NG313.-..B.. ▶	7MF4997-1AJ
Made of stainless steel for 7NG313.-..C..	7MF4997-1AH
Connection board	A5E02391790

▶ Available ex stock.

Ordering example 1:

7NG3137-0AB01-Z Y01+Y15+Y25+U03
 Y01: -10 ... +100 °C
 Y15: TICA1234HEAT
 Y25: 33

Ordering example 2:

7NG3137-0AC01-Z Y01+Y15+Y25+U25
 Y01: -10 ... +100 °C
 Y15: TICA 1234 ABC 5678
 Y25: 35

Factory setting:

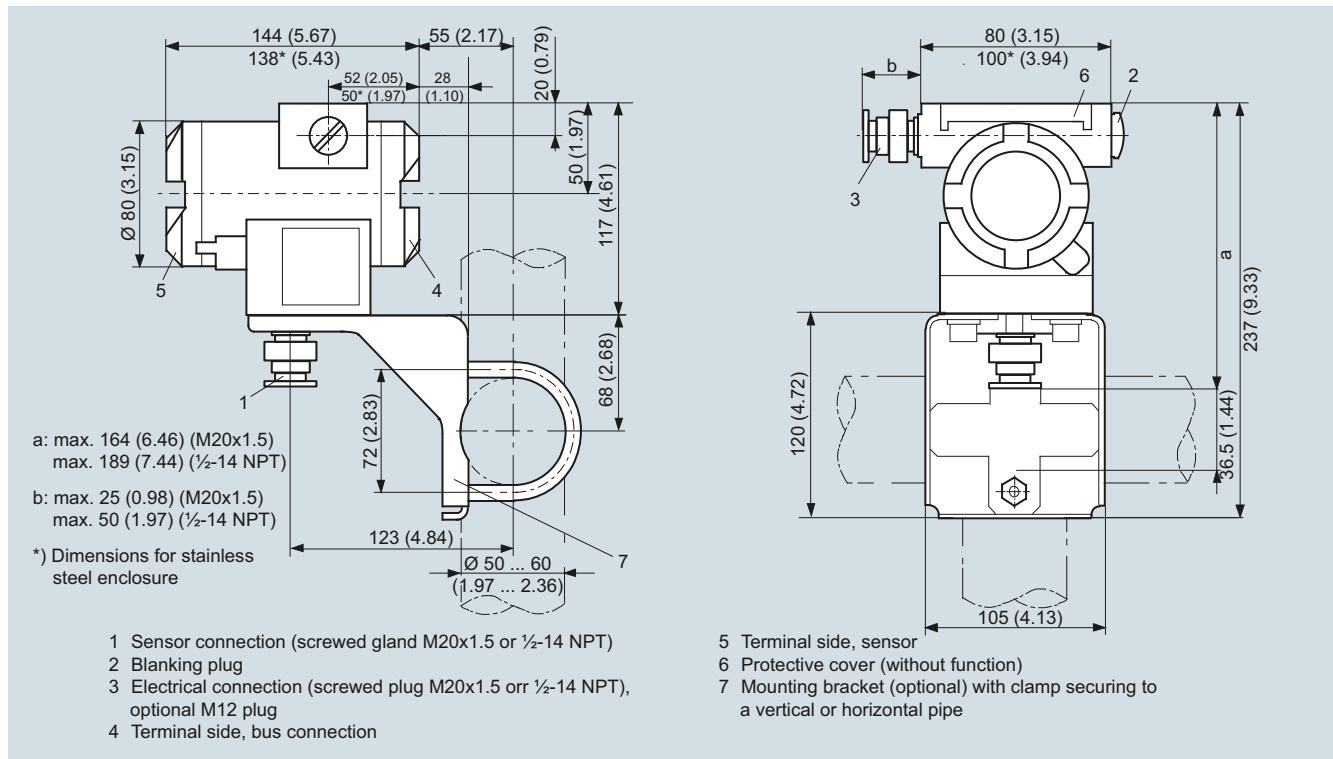
- for SITRANS TH400 PA:
 - Pt100 (IEC) with 3-wire circuit
 - Unit: °C
 - Failure mode: last valid value
 - Filter time: 0 s
 - PA address: 126
 - PROFIBUS Ident No.: manufacturer-specific
- for SITRANS TH400 FF:
 - Pt100 (IEC) with 3-wire circuit
 - Unit: °C
 - Failure mode: last valid value
 - Filter time: 0 s
 - Node address: 22

Temperature Measurement

Transmitters for field mounting

SITRANS TF fieldbus transmitter

Dimensional drawings

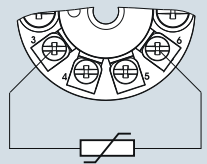


SITRANS TF with TH400, dimensions in mm (inches)

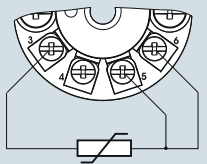
Schematics

2

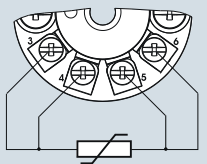
Resistance thermometer



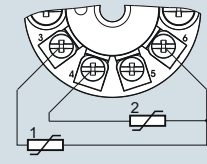
Two-wire system ¹⁾



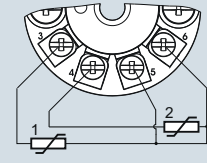
Three-wire system



Four-wire system



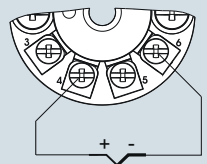
Mean-value/differential or redundancy generation 2 x two-wire system ¹⁾



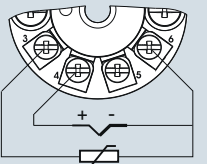
Mean-value/differential or redundancy generation 1 sensor in two-wire system ¹⁾ 1 sensor in three-wire system

¹⁾ Programmable line resistance for the purpose of correction.

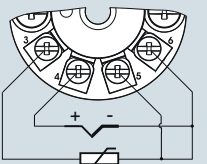
Thermocouple



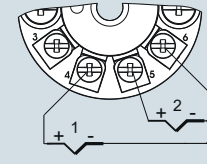
Internal cold junction compensation



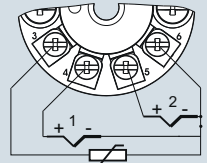
Cold junction compensation with external Pt100 in two-wire system ¹⁾



Cold junction compensation with external Pt100 in three-wire system

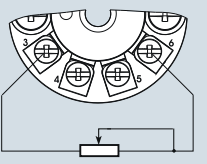


Mean value, differential or redundancy generation with internal cold junction compensation

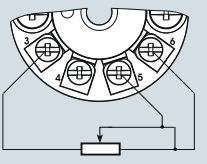


Mean value, differential or redundancy generation and cold junction compensation with internal Pt100 in two-wire system ¹⁾

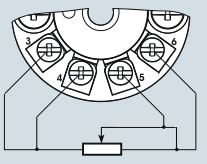
Resistance



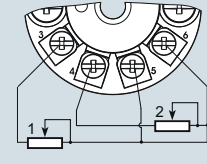
Two-wire system ¹⁾



Three-wire system

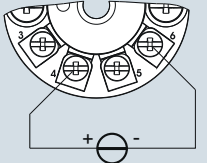


Four-wire system

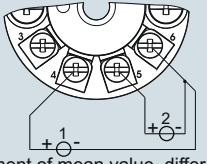


Mean value, differential or redundancy generation 1 resistor in two-wire system ¹⁾ 1 resistor in three-wire system

Voltage measurement



One voltage source



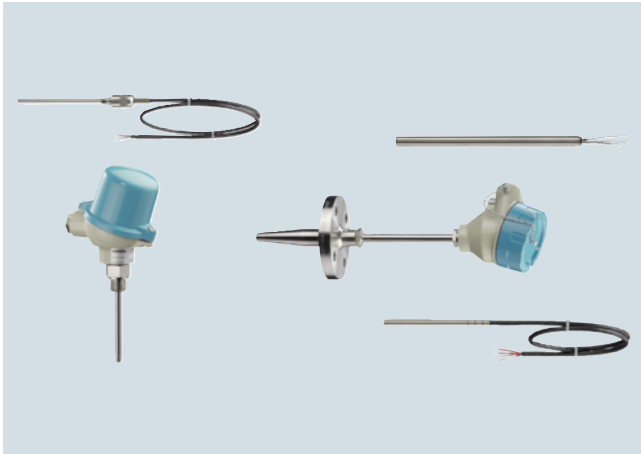
Measurement of mean value, differential and redundancy with 2 voltage sources

Temperature Measurement

SITRANS TS

Technical description

Overview



Temperature sensors of the SITRANS TS product family are used to measure temperatures in industrial equipment.

Siemens offers the following temperature sensors:

- SITRANS TS100
 - General use
 - Compact design with connection cable
- SITRANS TS200
 - General use
 - Compact design with plug/wire ends
- SITRANS TS300
 - Use in food, pharmaceuticals and biotechnology
 - Modular or clamp-on design
- SITRANS TS500
 - General use
 - Modular design with connection head and thermowell

Benefits

The modular design makes it possible to customize the temperature sensor for most applications, while still being able to use many standardized individual components.

Application

Depending on the specification, sensors can be combined with different connection heads, neck tubes and process connections. As a result, the sensors can be used in a large number of technical applications in the following industries:

- Chemical industry
- Petrochemical industry
- Power engineering
- Primary industry
- Pharmaceutical industry
- Biotechnology
- Food manufacturing

SITRANS TS100 and SITRANS TS200

Temperature sensors of the SITRANS TS100 series are cable thermometers with different electrical connection options (e.g. plug, soldered connections, connection cables)

The SITRANS TS200 series of compact thermometers is characterized by a compact design. Both temperature sensor series are suitable for the following:

- Measurements of temperatures of solids, where additional thermowells are not required for replacements done during ongoing operations, e.g. bearing block temperature.
- Measurements which are particularly critical with regard to response times. The advantages offered by an additional thermowell are purposely omitted.
- Measuring points which must be easy to convert or relocate.
- Surface temperature measurements: The temperature sensor is used in conjunction with a surface connection piece.
- Cost-effective transport: The mineral-insulated design allows for economically feasible transport even at large lengths. From a length of 0.8 m (2.63 ft), the sensors can be delivered rolled up or bended.

SITRANS TS300 temperature sensors for food, pharmaceuticals and biotechnology

The temperature sensors of the SITRANS TS300 series are thermometers especially designed for measurements with high hygienic demands, such as in the food, pharmaceutical and biotechnology industries. The basic versions are:

- Thermometers in modular design with replaceable measuring insert and process connections usual in the industry
- Clamp-on thermometers for measurement of the pipe surface temperature without interrupting the process

SITRANS TS500 Temperature sensors as a module system

Due to their modular design, temperature sensors of the SITRANS TS500 series are well suited to a large number of applications.

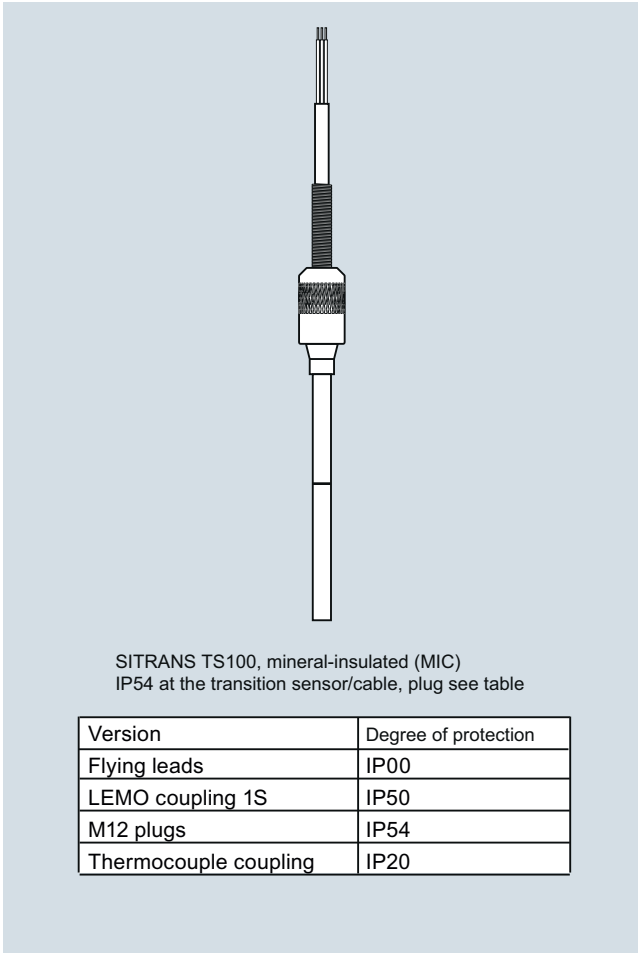
The replaceable measuring insert makes it possible to conduct maintenance work even during ongoing operations. These devices are used particularly frequently in vessels and pipelines of the following industries:

- Power stations
- Chemical industry
- Petrochemical industry
- General process engineering
- Water, waste water

Design

SITRANS TS100 7MC711xx

The following image illustrates the available designs for SITRANS TS100 temperature sensors:



SITRANS TS100, mineral-insulated (MIC)
IP54 at the transition sensor/cable, plug see table

Version	Degree of protection
Flying leads	IP00
LEMO coupling 1S	IP50
M12 plugs	IP54
Thermocouple coupling	IP20

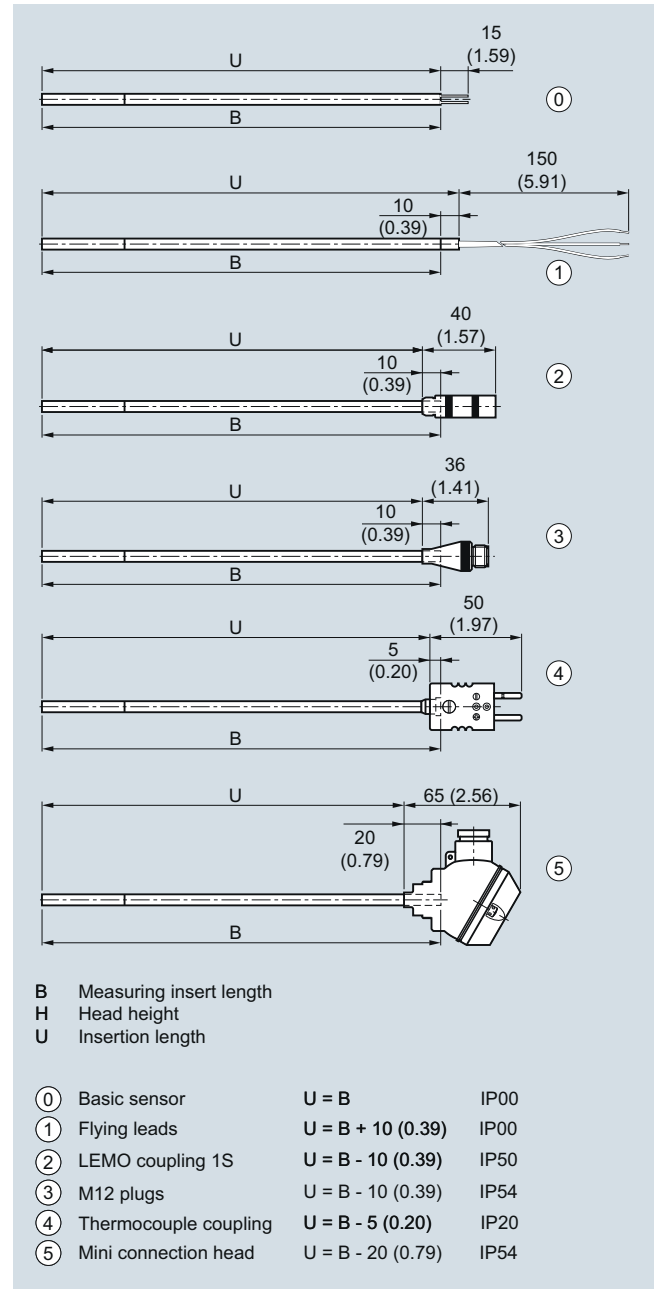
SITRANS TS100

The following types of process connections can be implemented:

- Compression fitting
- Spring-loaded compression fitting
- Soldering nipple
- Direct soldering/welding in

SITRANS TS200 7MC712xx

The following image illustrates the available designs for SITRANS TS200 temperature sensors:



B Measuring insert length
H Head height
U Insertion length

① Basic sensor	$U = B$	IP00
① Flying leads	$U = B + 10 (0.39)$	IP00
② LEMO coupling 1S	$U = B - 10 (0.39)$	IP50
③ M12 plugs	$U = B - 10 (0.39)$	IP54
④ Thermocouple coupling	$U = B - 5 (0.20)$	IP20
⑤ Mini connection head	$U = B - 20 (0.79)$	IP54

SITRANS TS 200, dimensions in mm (inch)

The following types of process connections can be implemented:

- Compression fitting
- Spring-loaded compression fitting
- Soldering nipple
- Direct soldering/welding in

Temperature Measurement

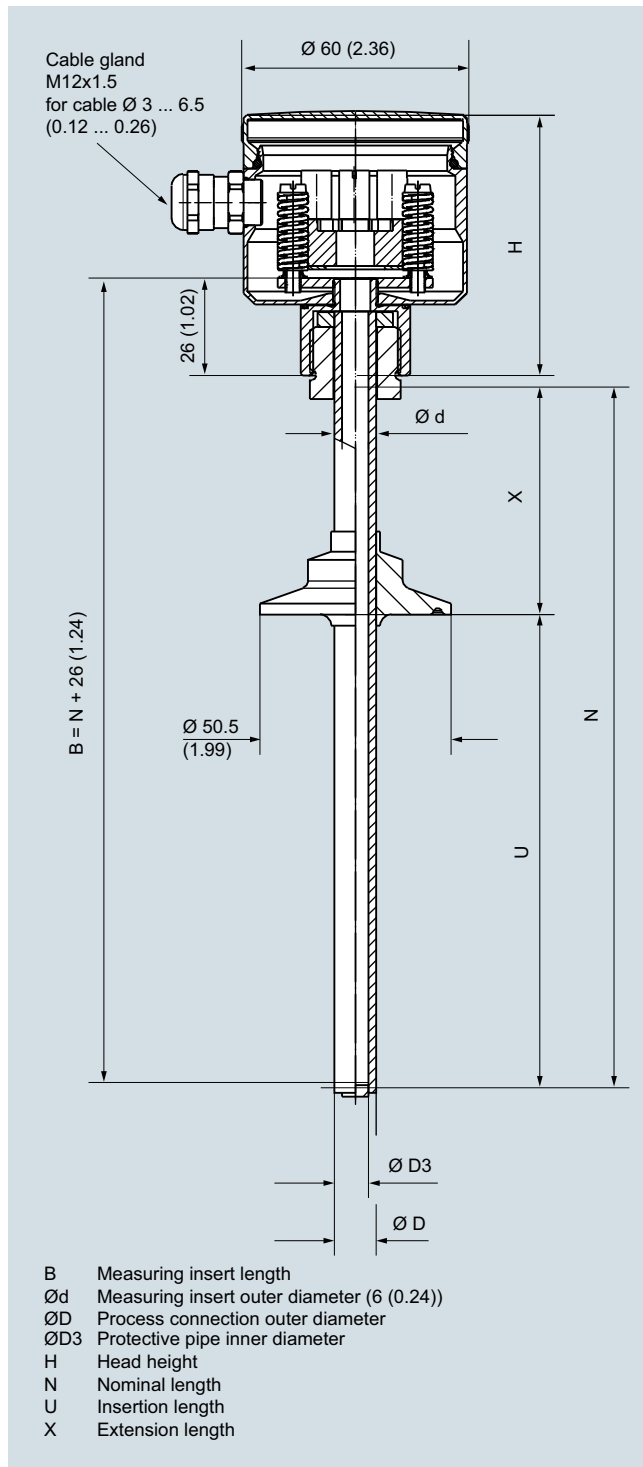
SITRANS TS

Technical description

SITRANS TS300

SITRANS TS300 modular design

The following figure shows the available versions and components of the SITRANS TS300 temperature sensors in modular design.



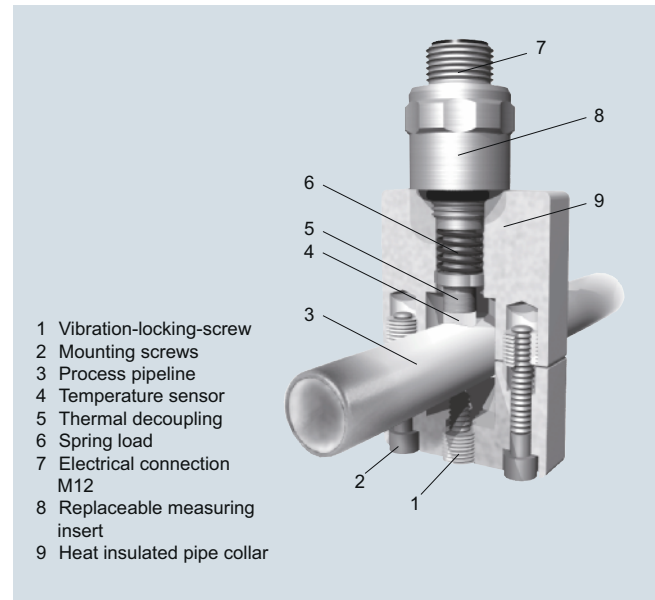
SITRANS TS modular design, dimensions in mm (inch)

SITRANS TS300 Clamp-on

Temperature measurement is carried out over a modified and quick-response Pt100 measuring element, which is positioned and insulated over a pipe collar made of heat-resistant plastic.

The measuring insert contains a special temperature sensor tip made of silver, which is pressed evenly onto the pipeline by means of a spring.

The compulsory guide of the replaceable measuring insert ensures even pressure contact on the pipeline, which ensures a reproducible measuring result.



Design

Measuring insert

- Special measuring insert made of stainless steel; hygienic design
- Measuring element made of silver, thermal decoupling through plastic insert

Measuring insert screwed into collar with spring load. Use heat-conductive-compound (see accessories) prior to mounting the device.

Pipe collar

- Material
- Ambient temperature influence

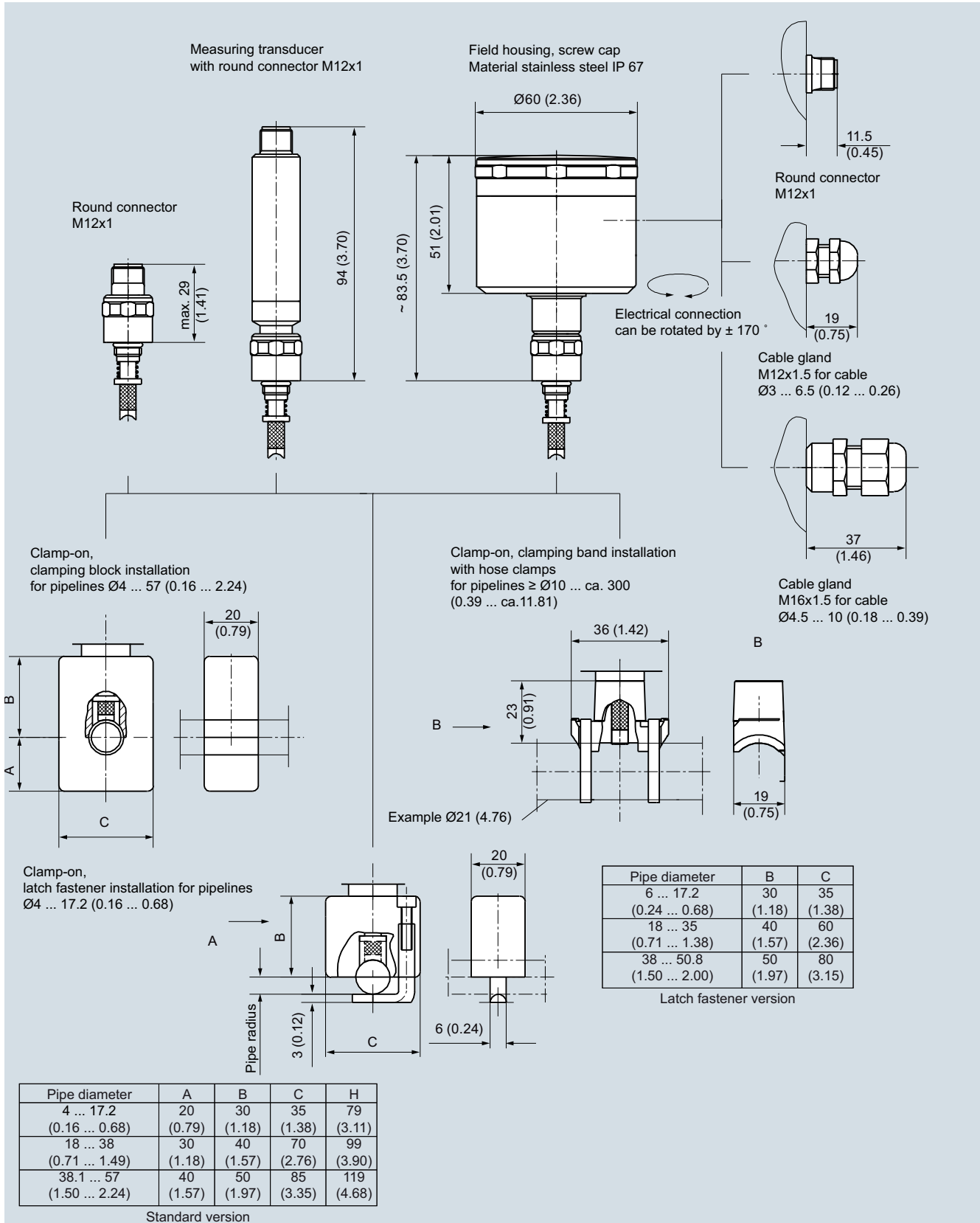
Temperature resistant high-performance plastic with integrated insulating system in the hygienic design

Approx. 0.2 %/10 K

The pipe diameter of the measuring tube is required for correct device selection. For special sizes, you start by selecting the matching collar size and entering the required size in plain text. Space-saving designs are available (latch fastener version) for installation in a limited space (e.g., tube bundles).

For correct assignment after recalibration, the collar as well as the measuring insert are identified with serial number and pipe diameter. This information can also be engraved.

The following figure illustrates the available designs and components for SITRANS TS300 temperature sensors in clamp-on design:



SITRANS TS300 clamp-on design, round connector, field enclosure, cable gland, versions, dimensions in mm (inch)

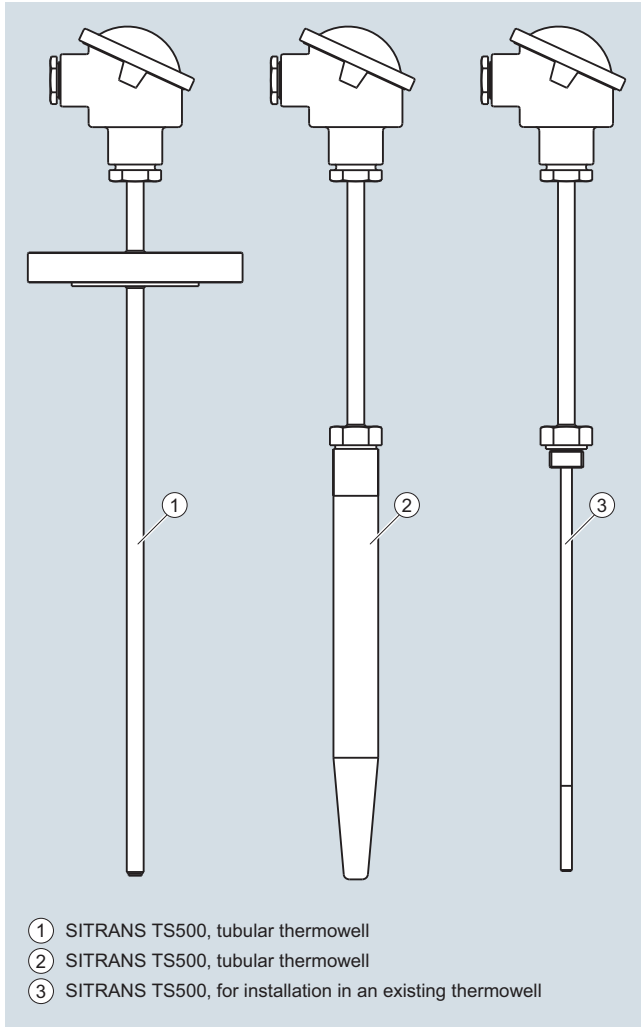
Temperature Measurement

SITRANS TS

Technical description

SITRANS TS500 7MC75xx

The following image illustrates the available designs for SITRANS TS500 temperature sensors:



SITRANS TS500 temperature sensors; the IP degree of protection depends on the connection head (see page 2/84)

The temperature sensors of the SITRANS TS500 series are available in three different designs:

Version	Description	Application	Process connection
1	<ul style="list-style-type: none"> Tubular thermowell Tubular thermowell and extension made of one pipe; closed at the tip with a welded bottom cap 	Minimal to medium process load	<ul style="list-style-type: none"> Welded connection with thread or flange connection with compression fitting
2	<ul style="list-style-type: none"> Barstock thermowell Barstock thermowell, tubular extension, extension screwed into thermowell 	Medium to highest process load	<ul style="list-style-type: none"> Directly welded into pipeline With welded flange With male thread
3	<ul style="list-style-type: none"> For installation into existing thermowells. Tubular extension 	Process load depends on thermowell design	Screwed into existing thermowell

Function

A complete measuring point consists of a measuring insert which contains the basic sensors, the protective fitting and an optional measurement value processor (transmitter).

The basic sensors are:

- Resistance thermometers:
Temperature measurement is based on the temperature dependency of the installed measuring resistor.
- Thermocouples:
Temperature measurement is based on the Seebeck effect. A thermocouple which subjected to a temperature drop produces thermoelectric voltage that can be measured.

Transmitters:

The optional Siemens transmitters assume the following functions:

- Optimum measurement processing
- Strengthening of weak sensor signals directly on site
- Transmits standardized signals
- Protects against electromagnetic interferences
- Support enhanced diagnosis options

The resistance thermometer is intended for installation in containers and pipelines for hygienic requirements.

- Modular design consisting of protective pipe, measuring insert, connection head and optional transmitter for replacement during operation.
- Hygienic version, design according to recommendations of the EHEDG
- Transmitter can be integrated (4 to 20 mA, PROFIBUS PA or FOUNDATION Fieldbus)

Configuration

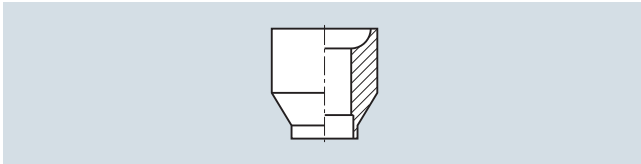
Components: Process connections

This catalog is limited to the standard versions. Special versions are available on request. The technical data is designed to assist the user. It is the responsibility of the ordering party to make the correct selection of suitable devices.

Welding

A welded thermowell provides a permanent, secure and highly resilient process connection. This advantage requires an adequate weld-in quality.

It is not possible to accidentally open the process connection. Additional gaskets are not required. If the tube is not thick enough to ensure a secure welding connection, the appropriate weldable sockets are used. With weldable sockets of matching length it is also possible to largely standardize a plant's measuring points. Stocks of spare parts can therefore be reduced to a minimum.

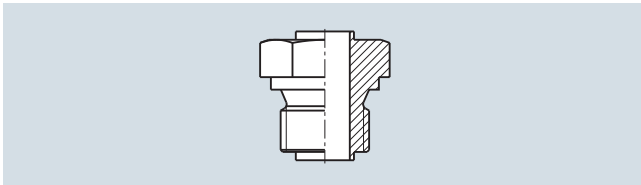


Weldable sockets

Thread

Type of installation: Welded threads

Welded threads of different thread types and sizes are firmly welded to the thermowell.



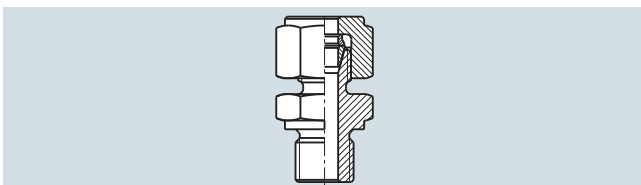
Welded threads

Type of installation: Compression fittings

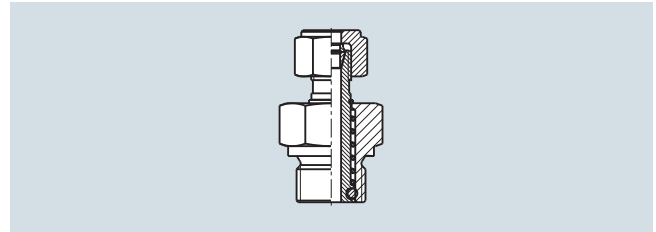
Compression fittings are available as accessories. They fit with the diameter of the thermowell and provide for flexible installation. The mounting length can be selected on site. When installed correctly, compression fittings are well suited for low and medium pressure.

The difference between a normal and spring-loaded design is as follows:

In the case of spring-loaded compression fitting, the sensor is pressed against the measured object or the tip of the thermowell, thus achieving outstanding heat contact.



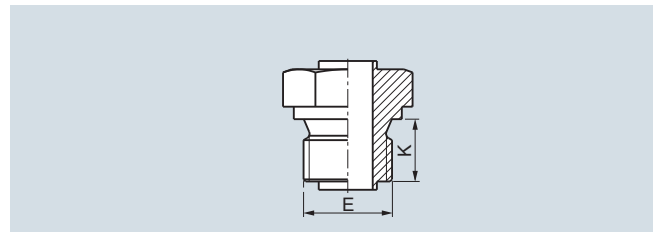
Compression fitting



Spring-loaded compression fitting

Thread type: Cylindrical thread

Cylindrical threads do not seal in the thread but due to an additional sealing face or seal. For example, threads with the short form "G" (as per ISO 228) feature a thread type with a defined screw gauge.

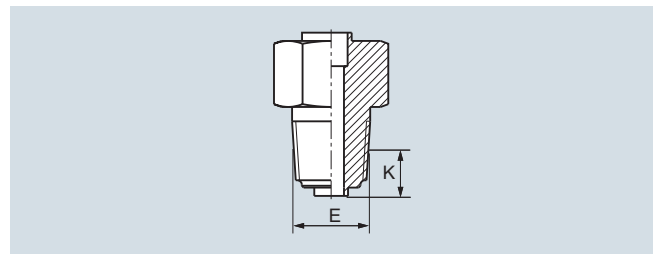


Cylindrical thread

The male threads of our G $\frac{1}{2}$ screw sockets fit with both female G $\frac{1}{2}$ as well as Rp $\frac{1}{2}$ threads.

Thread type: Tapered thread

Unlike cylindrical threads, tapered threads such as the American "NPT" seal metalically in the thread itself. The relevant length information in the catalog refers to the "torque point" of the thread, which cannot be precisely defined due to standardized tolerance levels. However, the spring unit of the measuring insert compensates for the differences in length.



NPT thread

Flanges

The different properties of the flanges are as follows:

- Standard series EN 1092, ASME 16.5,..
- Nominal pressure
- Nominal diameter
- Sealing face

This information is stamped into the flange, as well as the material code and batch number for "3.1 Material".

Industry-specific process connections

Special process connections have become popular in different industries. For example, hygiene technology: clamp connections, milk pipe unions and others.

Temperature Measurement

SITRANS TS

Technical description

Components: Thermowell

Thermowells fulfill two basic functions:

- They protect the measuring insert from aggressive media
- They make it possible to replace units during ongoing operations

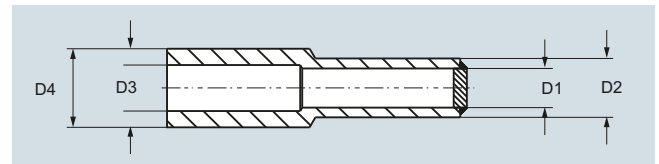
This catalog is limited to the standard versions. Special versions are available on request. The large number of available types can be classified as follows:

- Tubular thermowells
Tubular thermowells are also described as "welded" or "multi-part" thermowells (not to be confused with "multi-part protective armatures"). They are suitable for low to medium process loads and can be manufactured on a cost-effective basis.
Versions :
- Form 2N similar to DIN 43772 with straight tip and shortest possible extension length not adjustable connection head
- Form 2 as per DIN 43772 with straight tip and extension adjustable connection head
- Form 2: with process connection
Form 2G: Threaded connection
Form 2F: Flange connection
- Form 3 as per DIN 43772
Design with tapered tip and extension adjustable connection head
For these thermowells, thermowell tip is tapered by rotary swaging. This results in an excellent fit with the measuring insert and very good response times.
Analogous to forms 2, versions 3/3G/3F are also available for form 3
- Barstock thermowells
Where process loads are too high, or where thermowells with welded seams are not allowed, deep hole drilled barstock thermowells are used. Form 4 thermowells (as per DIN 43772) are very popular in this area. This thermowell type replaces the D1-D5 types of the predecessor standard DIN 43763:

DIN 43763 design invalid	DIN 43772 design 4 current	
	L	U
D1	140	65
D2	200	125
D4	200	65
D5	200	125

The following table shows the dimensions of the different thermowells.

Thermowell type, design	Tip		Process connection	
	Ø Inner [mm (inch)]	Ø Outer [mm (inch)]	Ø Inner [mm (inch)]	Ø Outer [mm (inch)]
2N/2/2G/2F, tubular	D ₁	D ₂	D ₃	D ₄
2/2G/2F, tubular	7 (0.28)	9 (0.35)	7 (0.28)	9 (0.35)
3/3G/3F, tubular	6 (0.24) tolerance acc. to DIN 43772	9 (0.35)	7 (0.28)	12 (0.47)
4/4F, barstock	7 (0.28)	12,5 (0.49)	7 (0.28)	24 (0.94)
4/4F, fast response, barstock	3.5 (0.14)	9 (0.35)	3.5 (0.14)	18 (0.71)



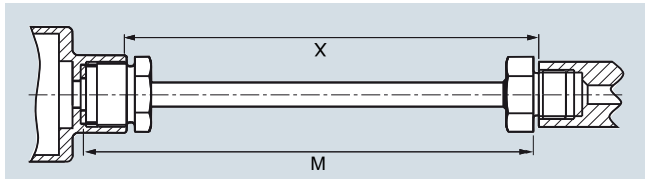
Sizing of thermowells

Components: Extension (neck tube)

The extension is the section from the lower edge of the connection head to the fixed point of the process connection or thermowell. There is a variety of terms for this components, e.g. neck tube. For this reason the term extension has been selected as a standardized term for the different designs. Function is the deciding factor:

- Thermal decoupling of connection head from process temperature see image page 16
- Installation of connection head over existing insulation
- Simple standardization of measuring inserts: In general, the length of the extension may be freely selected. However, when using standardized insertion lengths, the option "Extension as per DIN 43 772" is recommended. This ensures that measuring inserts which are quickly available can be used. In case of special lengths, it is possible to standardize the measuring insert length through a clever combination with the respective special extension length. This allows customers to optimize their costs in purchasing and logistics.
- In the case of American-designed sensors, the extension also takes the spring load of the measuring unit.
- Depending on the design, the extension can also be used to achieve an alignment of the connection head.
- The form of the extension depends on the form of the thermowell:
 - Tubular thermowell
The extension and thermowell usually consist of one continuous tube. The process connection is welded on. (= one-piece protective armature).
 - Barstock thermowells
Extension and thermowell of two components which are welded together. The process connection is attached to the thermowell (= multi-piece protective armature).

Thermowell type	X [mm (inch)]	M [mm (inch)]	Divisible
2G	129 (5.08)	145 (5.71)	No
2F	64 (2.52)	80 (3.15)	No
3G	131 (5.19)	147 (5.79)	No
3F	66 (2.60)	82 (3.23)	No
4 (only L=110)	139 (5.47)	155 (6.10)	Yes
4 (others)	149 (5.87)	165 (6.50)	Yes




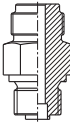
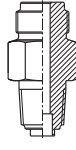






Extensions as per DIN 43772

Versions

With regard to their function, extensions can be classified into two types:

- Ajustable/not ajustable:
Function on the neck tube to align the connection head to the desired direction
- Integrated measuring insert spring load:
In the case of American-type sensors, the spring load of the measuring insert is integrated into the extension. Measuring insert and extension form one unit.

European type ajustable, cylindrical	European type ajustable, tapered	wihtout extension wihtout thread (optional gland)
		
European type not ajustable, cylindrical	European type not ajustable, tapered	European type not ajustable, nipple
		
European type ajustable nipple-union-nipple	American type ajustable, nipple-union-nipple spring load	American type not ajustable nipple-union-nipple spring load
		

Versions: particularly with heavy stainless steel connection heads in combination with vibration, a short extension length should be selected or external support should be provided.

Temperature Measurement

SITRANS TS

Technical description

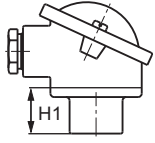
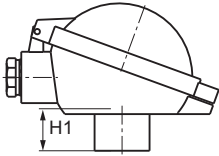
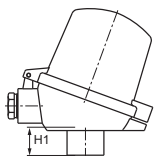
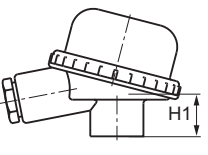
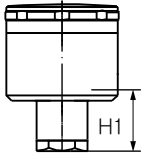
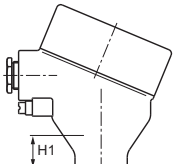
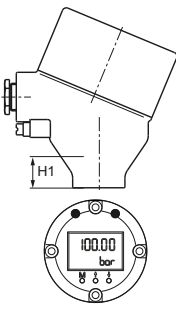
Components: Connection head

Connection head

The connection head protects the connection department.

The connection head features sufficient room for mounting a clamping base or transmitter.

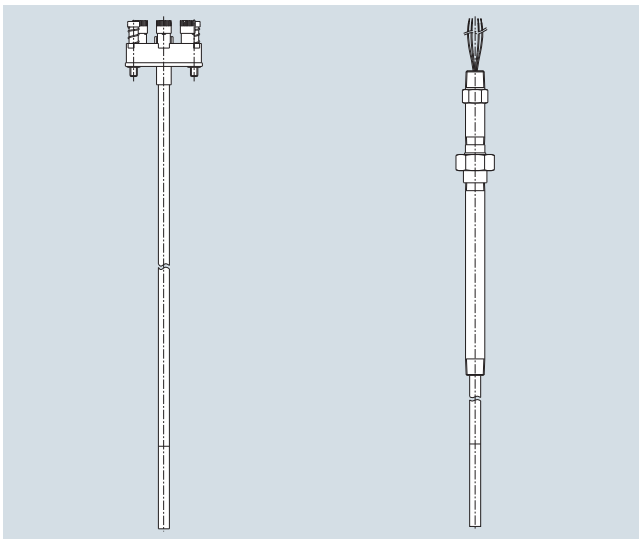
Different connection heads are used depending on the application and preference:

Connection head	Type Material	Designation	Cable gland	Degree of protection	Transmitter installation	Connection height H1 [mm (inch)]	Explosion protection optional
	BA0 Aluminum	Flange lid	M20 x 1,5 brass	IP54	Measuring insert	26 (1.02)	Ex i
	BB0 Aluminum	Hinged cover low	M20 x 1,5 brass	IP65	Measuring insert	26 (1.02)	Ex i
	BC0 Aluminum BP0 Plastic	Hinged cover high	M20 x 1,5 BC0: brass BP0: polyamide	IP65	Measuring insert and/or hinged cover (standard)	26 (1.02)	Ex i
	BM0 Plastic	Screw cover	M20 x 1,5 polyamide	IP65	Measuring insert	26 (1.02)	Ex i
	BS0 Stainless steel	Screw cover	M12 x 1,5 polyamide	IP67	Measuring insert	26 (1.02)	Ex i
	AG0 Aluminum AU0 Stainless steel	Screw cover, heavy-duty	M20 x 1,5 not Ex: plastic Ex i/Ex n: brass Ex d: without cable gland	IP66/68	Measuring insert	41 (1.61)	Ex i, Ex d
	AH0 Aluminum AV0 Stainless steel	Screw cover, sight glass, heavy-duty, with 4 ... 20 mA display	M20 x 1,5 not Ex: plastic Ex i/Ex n: brass Ex d: without cable gland	IP66/68	Measuring insert	41 (1.61)	Ex i, Ex d

Components: Measuring insert

Measuring insert

The measuring insert of the temperature sensor is built into the protective armature (thermowell, extension and connection head). The sensor element is protected in the measuring insert. The spring load of the Siemens measuring inserts provide good thermal contact with the bottom of the thermowell, and vibration resistance is significantly increased. Only highly resistant mineral-insulated cables (so-called MIC) are used for the electrical connection between the sensor element and connection head. The highly compacted insulation of magnesium oxide achieves excellent level of vibration resistance. The following measuring insert designs are the most widely used on the world market:



European type

American type

European type

European type measuring inserts can be replaced without having to dismantle the connection head. The springs are located either on the transmitter or the terminal block. This makes it possible to achieve a 8 to 10 mm spring range. If no transmitter is mounted, there is a ceramic base in its place. However, with the order option G01, a version with free wire ends instead of a ceramic base can be selected for mounting head-mounted transmitters.

American type

American-type measuring inserts feature a large spring range. These measuring inserts are ideal for use with NPT threads with the typical loose tolerances. In this configuration, the extension function is partially or fully integrated (nipple-union-nipple). Moreover it is also possible to directly attach field devices, e.g. SITRANS TF.

Components: Transmitters

SITRANS TH head transmitters process the weak non-linear sensor signals and transmit a stable and temperature-linear standard signal, thereby minimizing sensor signal disruptions.

The transmitters permanently monitor the temperature sensors and transmit diagnostic data to superordinate systems.

Because of the low energy feed of the SITRANS TH head transmitters, self-heating of the temperature sensors can be maintained at minimal levels.

The electrical isolation and integrated cold junction ensure that temperature sensors with thermocouples provide reliable measurements at a low cost.

SITRANS TH product family

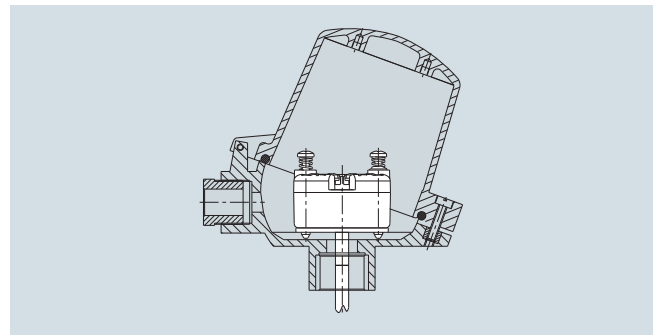
For detailed technical data on the SITRANS TH transmitters, please refer to the catalog FI 01.

- TH100 - the basic device
 - Output 4 to 20mA
 - for Pt100
 - can be configured using simple software
- TH200 - the universal device
 - Output 4 to 20mA
 - Resistance thermometer, thermocouples
 - can be configured using simple software
- TH300 - HART universal
 - Output 4 to 20 mA/HART
 - Resistance thermometer, thermocouples
 - HART conforming
 - Diagnostic functions
- TH400 - Fieldbus PA and FF
 - Output PROFIBUS PA or FOUNDATION Fieldbus
 - Resistance thermometer, thermocouples
 - Diagnostic functions; for detailed technical description of the SITRANS TH transmitter please refer to the related chapter of this catalog.

Installation types

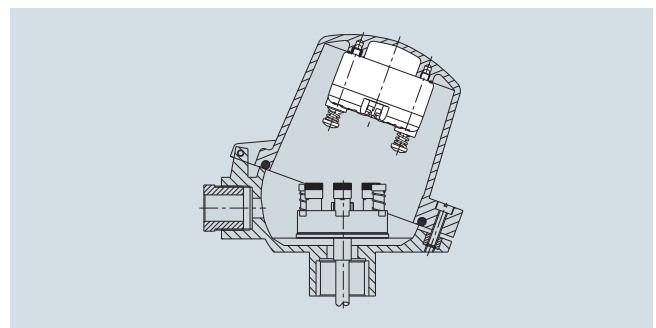
All SITRANS TH transmitters can be installed in type B connection heads. The following installation forms are used:

- Measuring insert installation
 - Our standard version offers the following advantages
 - Small vibrating masses and compact design
 - Insert-transmitter unit can be replaced quickly



Installation of measuring insert

- Hinged cover installation
 - Standard for head type BC0 and BP0
 - Advantage: Measuring insert and transmitter can be repaired/maintained separately (recalibration).



Hinged cover installation

Temperature Measurement

SITRANS TS

Technical description

Measuring technology: Sensor elements

The diverse application spectrum for industrial temperature measuring technology requires different sensor technologies.

Resistance thermometer

Sensor elements made of other basic materials with different nominal resistances or different underlying standards are available on request. Resistance thermometers can be classified as follows:

- **Basic design:**
The sensor element is built with thin layer technology. The resistance material is applied in the form of a thin layer on a ceramic carrier material.
- **Versions featuring increased vibration-resistance:**
In addition to the basic design, the vibration resistance is improved through extra measures.
- **Versions with expanded measuring range:**
Elements in wire-wound design. The wire winding is embedded in a ceramic body.

Thermocouples

Other thermocouples based on other thermo couples or underlying standards are available upon request.

The most common base metal thermocouples include:

- Type N (NiCrSi-NiSi) high degree of stability even in upper temperature range.
- Type K (NiCr-Ni) more stable than type J, but drifts in upper range.
- Type J (Fe-CuNi) narrow application band

Measuring technology: Measuring range

The measuring range describes the temperature limits within which the thermometer can be used in a way that is meaningful for measurement purposes. Depending on the loads present, the thermowell materials and the desired accuracy levels, the actual application range for the thermometer may be smaller.

Resistance thermometer [°C (°F)]	
Basic version and increased vibration resistance	-50 ... +400 (-58 ... +752)
Expanded measuring range	-196 ... +600 (-320.8 ... +1112)
Thermocouple [°C (°F)]	
Type N	-40 ... +1100 (-40 ... +2112)
Type K	-40 ... +1000 (-40 ... +1132)
Type J	-40 ... +750 (-40 ... +1382)

Thermocouples

The tolerance classes of the thermocouples correspond with IEC 584/EN 60584:

Catalog versions

Type	Basic accuracy, Class 2	Increased accuracy, Class 1
N	-40 °C ... +333 °C ±2.5 °C (-40 °F ... +631 °F ±4.5 °F) 333 °C ... 1100 °C ±0.0075x t [°C] (631 °F ... 2012 °F ±0.0075x t [°F]-32)	-40 °C ... +375 °C ±1.5 °C (-40 °F ... +707 °F ±2.7 °F) 375 °C ... 1000 °C ±0.004x t [°C] (707 °F ... 1832 °F ±0.004x t [°F]-32)
K	-40 °C ... +333 °C ±2.5 °C (-40 °F ... +631 °F ±4.5 °F) 333 °C ... 1000 °C ±0.0075x t [°C] (631 °F ... 1832 °F ±0.0075x t [°F]-32)	-40 °C ... +375 °C ±1.5 °C (-40 °F ... +707 °F ±2.7 °F) 375 °C ... 1000 °C ±0.004x t [°C] (707 °F ... 1832 °F ±0.004x t [°F]-32)
J	-40 °C ... +333 °C ±2.5 °C (-40 °F ... +631 °F ±4.5 °F) 333 °C ... 750 °C ±0.0075x t [°C] (631 °F ... 1382 °F ±0.0075x t [°F]-32)	-40 °C ... +375 °C ±1.5 °C (-40 °F ... +707 °F ±2.7 °F) 375 °C ... 750 °C ±0.004x t [°C] (707 °F ... 1382 °F ±0.004x t [°F]-32)

Other thermocouples, ignoble

Type	Basic accuracy, Class 2	Increased accuracy, Class 1
T	-40 °C ... 133 °C ±1 °C (-40 °F ... +271 °F ±1.8 °F) 133 °C ... 350 °C ±0.0075x t [°C] (271 °F ... 662 °F ±0.0075x t [°F]-32)	-40 °C ... +125 °C ±0.5 °C (-40 °F ... +257 °F ±0.9 °F) 125 °C ... 350 °C ±0.004x t [°C] (257 °F ... 662 °F ±0.004x t [°F]-32)
E	-40 °C ... +333 °C ±2.5 °C (-40 °F ... +631 °F ±4.5 °F) 333 °C ... 900 °C ±0.0075x t [°C] (631 °F ... 1652 °F ±0.0075x t [°F]-32)	-40 °C ... +375 °C ±1.5 °C (-40 °F ... +707 °F ±2.7 °F) 375 °C ... 800 °C ±0.004x t [°C] (707 °F ... 1472 °F ±0.004x t [°F]-32)

Measuring technology: Measuring accuracy

Resistance thermometer

The tolerance classes of the resistance thermometers correspond with IEC 751/EN 60751:

Tolerance	Δt
Basic accuracy, Class B	±(0.30 °C +0.0050 t [°C]) ±(0.54 °F +0.0050 t [°F]-32)
Increased accuracy, Class A	±(0.15 °C +0.0020 t [°C]) (±(0.27 °F +0.0020 t [°F]-32))
High degree of accuracy, Class AA (1/3 B)	±(0.10 °C +0.0017 t [°C]) (±(0.18 °F +0.0017 t [°F]-32))

The following tables provide an overview of the scope of these tolerances. If you exceed the specified limits with a resistance thermometer, the values of the next lower accuracy class apply:

Resistance thermometer Basic version [°C (°F)]	
Tolerance	Range
Basic accuracy, Class B	-50 ... +400 (-58 ... +752)
Increased accuracy, Class A	-30 ... +300 (-22 ... +572)
High degree of accuracy, Class AA (1/3 B)	0 ... 150 (32 ... 302)

Resistance thermometer Increased vibration-resistance [°C (°F)]	
Tolerance	Range
Basic accuracy, Class B	-50 ... +400 (-58 ... +752)
Increased accuracy, Class A	-30 ... +300 (-22 ... +572)
High degree of accuracy, Class AA (1/3 B)	0 ... 150 (32 ... 302)

Resistance thermometer Expanded measuring range [°C (°F)]	
Tolerance	Range
Basic accuracy, Class B	-196 ... +600 (-321 ... +1112)
Increased accuracy, Class A	-100 ... +450 (-148 ... +842)

Other thermocouples. noble

Type	Basic accuracy, Class 2	Increased accuracy. Class 1
R and S	0 °C ... 600 °C ± 1.5 °C (32 °F ... 1112 °F ± 2.7 °F) 600 °C ... 1600 °C ± 0.0025 x t (1112 °F ... 2912 °F ± 0.0025 x t)	0 °C ... 1100 °C ± 1 °C (32 °F ... 2012 °F ± 1.8 °F) 1100 °C ... 1600 °C ± [1 + 0.003 (t - 1100)] °C (2112 °F ... 2912 °F ± [1.8 + 0.003 (t - 212)] °F)
B	600 °C ... 1700 °C ± 0.0025 x t (1112 °F ... 3092 °F ± 0.0025 x t)	

SITRANS TS300 Clamp-on

Measuring accuracy

Reference conditions

- Pipeline: 13 x 1.5 mm (0.51 x 0.06 inch) made of stainless steel using thermal paste
 - Ambient temperature: 20 °C (68 °F)
 - Medium: Water, 120 °C (248 °F)
 - Flow speed: 3 m/s (9.84 ft/s)
- Measuring accuracy using thermal paste (The accuracy depends on the geometry of the pipeline, the medium and the ambient conditions.
 T_M = process temperature;
 T_A = ambient temperature)
- Application, process-optimized for steam sterilization: for 100 ... 150 °C (212 ... 302 °F) $(T_A - T_M) \times 0.01$
 - Application, alternative class A as per IEC 60751: -40 ... +150 °C (-40 ... 302 °F) $(T_A - T_M) \times 0.02$

Measuring technology: Response times

Response time describes the speed of the measurement system in the case of a temperature change, and is typically indicated as T0.5 or T0.9. The values indicate the time in which a measured value has increased to 50% or 90% of the actual temperature increase.

The main variables which affect response time are as follows:

- Ideal thermowell geometry includes:
 - smallest possible material at the tip
 - use of conductive material
- Thermal connection of measuring insert to thermowell: Due to the optimized design of the Siemens inserts (small gap width, spring system), they feature very good response behavior. Because of the good fit, additional contact materials are not usually required except in certain applications e.g. attachment of a surface sensor.
- Size of temperature increase
- Medium and flow rate

Resistance thermometer

Typical values as per EN 60751 in water at 0.4m/s can be found in the following table.

Thermowell form	Diameter [mm (inch)]	T0.5	T0.9
None	6 (0.24)	6	15
Straight (2)	9 (0.35)	34	90
	12 (0.47)	45	143
Tapered (3)	12 (0.47)	15	31
Barstock (4) U=65	24 (0.95)	40	100
Barstock (4)] U=125	24 (0.95)	45	110

Thermocouples

Typical values as per EN 60751 in water at 0.4m/s can be found in the following table.

Thermowell form	Diameter [mm (inch)]	T0.5	T0.9
None	6 (0.24)	2	4
Straight (2)	9 (0.35)	20	63
	12 (0.47)	19	66
Tapered (3)	12 (0.47)	7	22
Barstock (4) U=65	24 (0.95)	22	73
Barstock (4)] U=125	24 (0.95)	20	53

Temperature Measurement

SITRANS TS

Technical description

Measuring technology: Mounting depth

Measuring insert

Type	Temperature-sensitive length (TSL) [mm (inch)]	Non-bendable length [mm (inch)]
Basic	50 (1.97)	30 (1.82)
Increased vibration resistance	50 (1.97)	30 (1.82)
Expanded measuring range	50 (1.97)	60 (2.36)
Thermocouple	20 (0.79)	5 (0.20)

Immersion depth/contact with media

Ambient conditions (temperature/climate/insulation) and the design of the thermowell, process connection and piping result in so-called "heat transmission errors".

To prevent such an error, the submersion depth and diameter of the thermowell tip will be defined. The temperature-sensitive length (TSL) of the thermowell must also be taken into account. The following rule of thumb can be used:

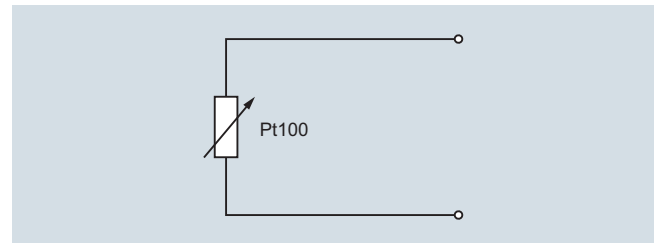
- Water
Submersion depth \geq TSL + 5 x \varnothing of thermowell
- Air
Submersion depth \geq TSL + 10 ... 15 x \varnothing of thermowell
- Recommendations
 - Select largest possible submersion depth
 - Select measuring location with higher flow velocity
 - Thermal insulation for outer thermometer components
 - Smallest possible surface for outer components
 - Insertion in pipe bends
 - Direct measurements without additional thermowell if no suitable solution can be found using other measures.

Measuring technology: Connection types

In the case of resistance thermometers, the type of sensor connection directly affects the level of accuracy:

Two-wire system

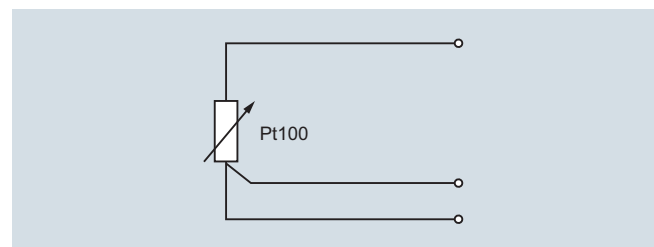
The resistance of sensor lines are included in the measurement result as an error. Adjustments are recommended in this case.



Pt100 Two-wire system

Three-wire system

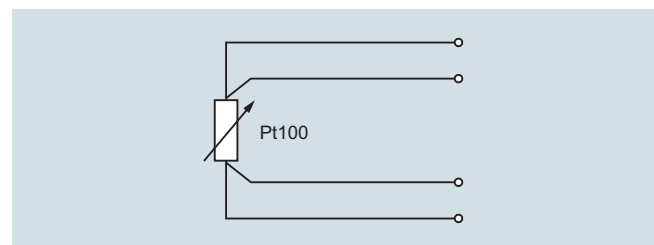
Line resistance is not included in the measurement result. Requirements: all terminal and line resistances (corrosion) are at the same level, and terminals are at the same temperature level.



Pt100 Three-wire system

Four-wire system

Line resistance is not included in the measurement result. This type of connection is the most secure and most accurate.



Pt100 Four-wire system

Siemens measuring inserts can be used to implement all types of connections for 1 x Pt100 devices. In the case of 2 x Pt100 versions, two- and three-wire systems are also possible. For measurement-related reasons, we always recommend a 1 x four-wire or 2 x 3-wire connection.

Temperature influence

At the connection head TS500¹⁾

	Without transmitter [°C (°F)]	With transmitter [°C (°F)]
Aluminum or stainless steel	-40 ... +100 (-40 ... +212)	-40 ... +85 (-40 ... +185)
Plastic	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)

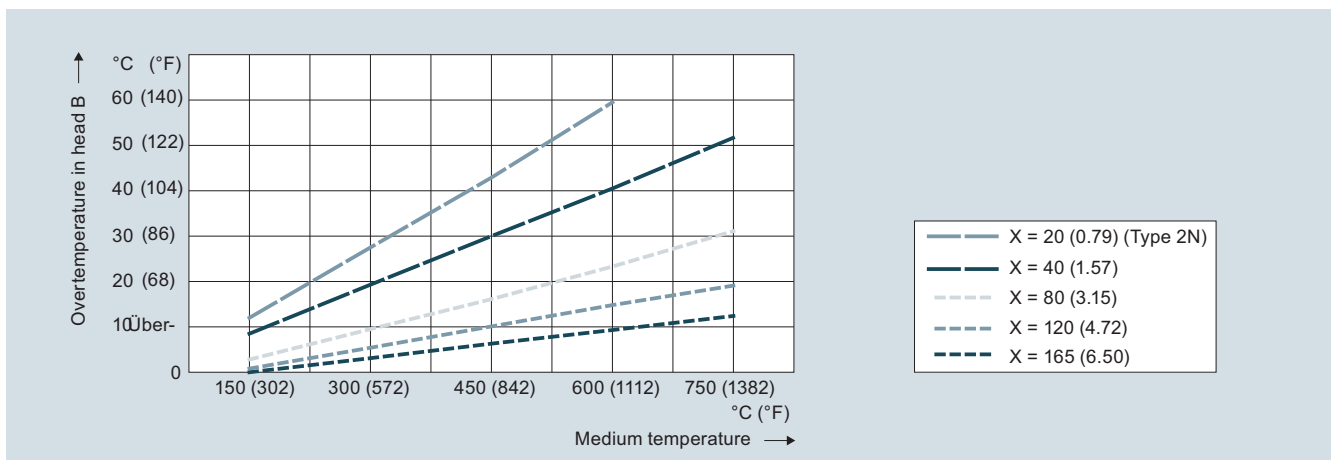
¹⁾ Notice manual at Ex-applications, please

At the TS100/200 connector/cable connection point:

The specified measuring range is valid for the hot end of the sensor. At the cold end, the maximum permitted temperature depends on the cables and plugs used. < 80 °C (176 °F) is uncritical for all types

Influence of extension

The illustration below assists you in selecting the right length for the neck tube. In this case, the following applies: Connection head temperature = Ambient temperature + Overtemperature. The temperature in the connection head can thus be assessed as follows:



Extension length X, effect on temperature, dimensions in mm (inch)

Please note that guidance values may change due to local conditions. Please consider these potential changes particularly with respect to explosion protection.

Also note that the accuracy of the transmitter also depends on the temperature in the connection head.

Temperature Measurement

SITRANS TS

Technical description

SITRANS TS300 Clamp-on

Design

Measuring insert

- Special measuring insert made of stainless steel; hygienic design
- Measuring element made of silver, thermal decoupling through plastic insert

Measuring insert screwed into collar with spring load. Use heat-conductive-compound (see accessories) prior to mounting the device.

Pipe collar

- Material

Temperature resistant high-performance plastic with integrated insulating system in the hygienic design

- Ambient temperature influence

Approx. 0.2 %/10 K

Process connection/Thermowell

When selecting a process connection, the process parameters sometimes only allow a specific technology. In addition, regional standard-related and customer-specific requirements must be observed. The range of products therefore includes a broad selection of standard connections.

In the case of redesigned or newly designed facilities, it is possible to achieve cost savings by implementing various measures:

- Use of standard lengths through clever selection of screw, weld or flange sockets
- Moveable compression fittings

The temperature resistance of a material for process connections and thermowells also limits the application area of the temperature sensor. The temperature range indicated on the type plate always refers to the measuring insert, not the material which comes into contact with media. Two aspects must be considered when assessing temperature stability:

- What maximum temperature may the material reach without a load?
- What is the behavior under load?

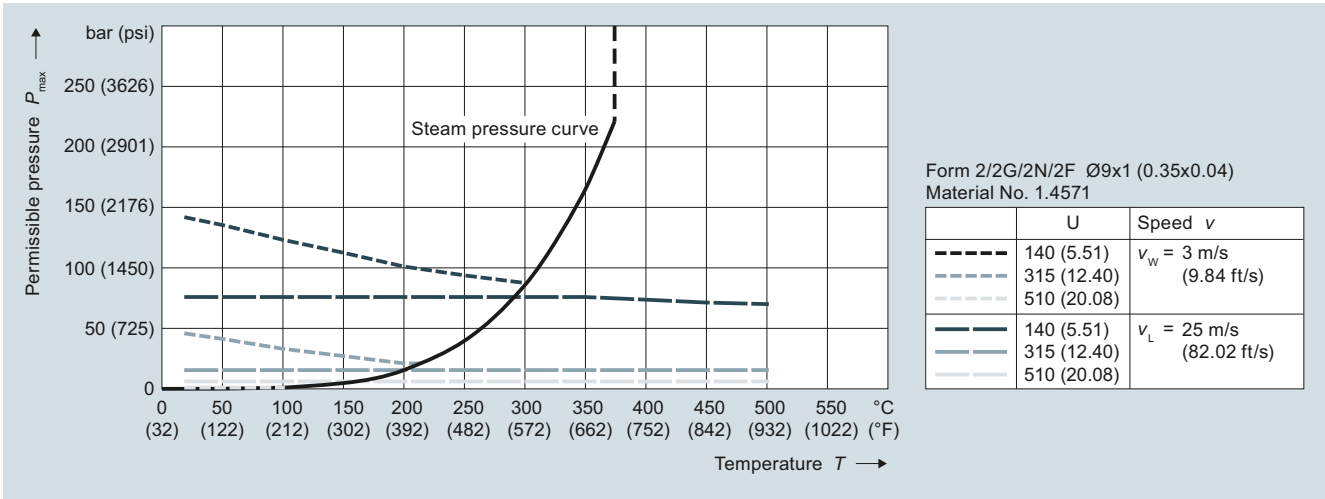
Process load

Because of the large variety of possible applications and variables, it is not possible to make general binding statements regarding the resilience of components which comes into contact with media. The load diagrams below can be used for common applications. However, where operating conditions vary significantly, please contact our technical support team.

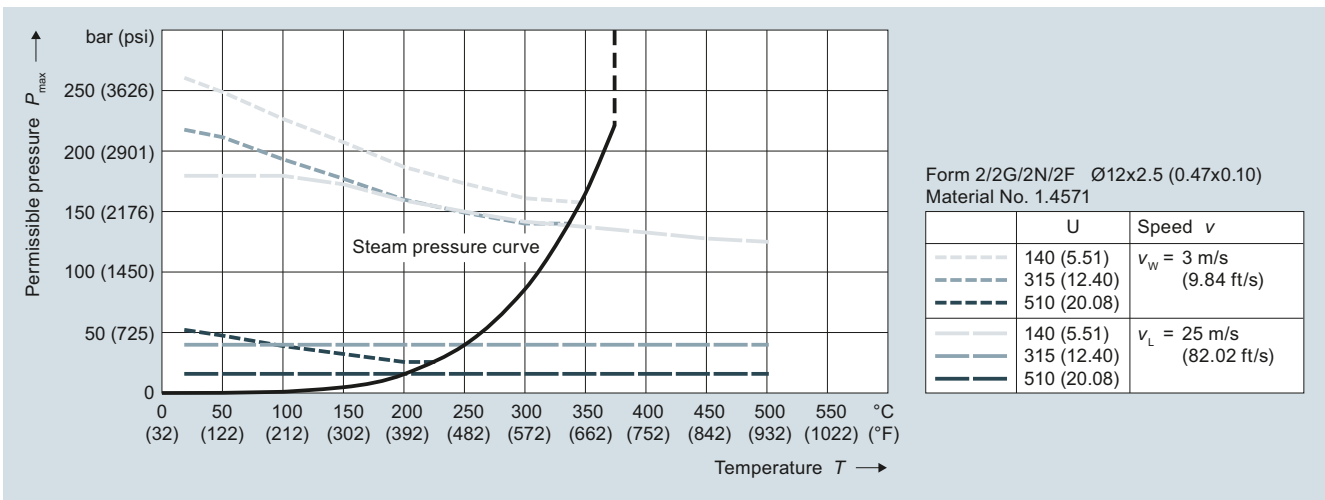
Load on the thermowell and remedies:

The process itself	Correction options
Temperature	Material selection
Pressure	Thermowell type
Flow velocity	Insertion length, thermowell type
Viscosity	Insertion length, thermowell type
Vibration	Support against vibration
Corrosiveness	Material selection, coating
Abrasion (e.g. carbon dust)	Sensing rod, coating

Load diagrams



Thermowells with Ø 9 x 1 mm (0.35 x 0.04 inch), dimensions in mm (inch)



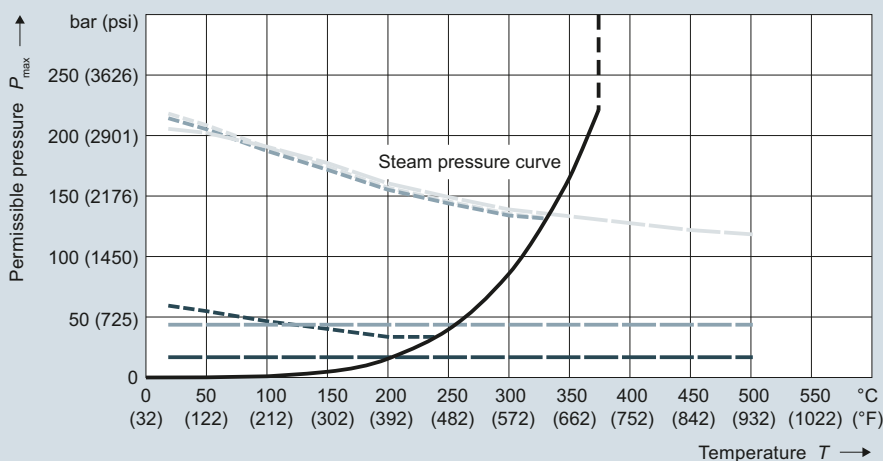
Thermowells with Ø 12 x 2.5 mm (0.47 x 0.10 inch), dimensions in mm (inch)

Temperature Measurement

SITRANS TS

Technical description

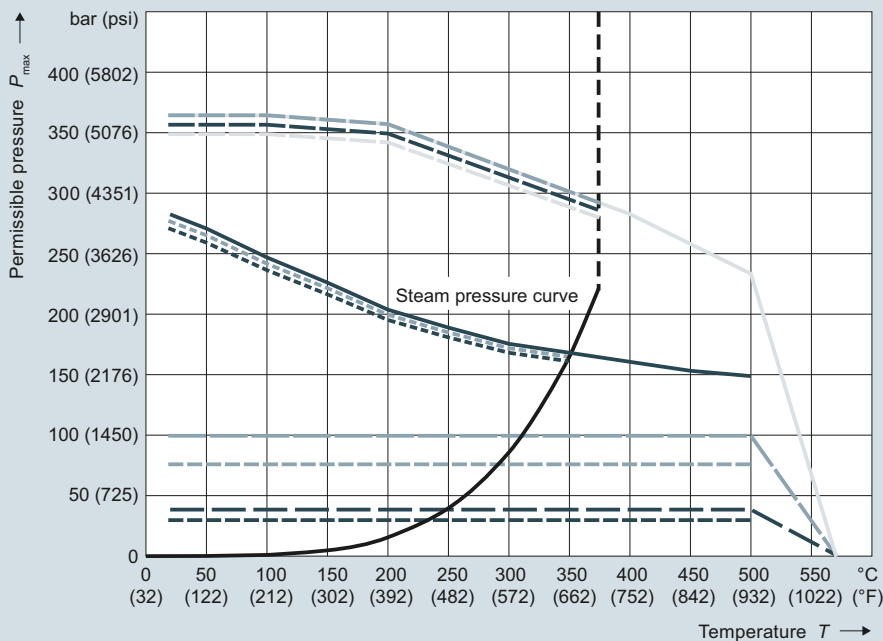
2



Form 3/3G/2F Ø12x2.5 (0.47x0.10)
Material No. 1.4571

	U	Speed v
---	140 (5.51)	$v_w = 3 \text{ m/s}$ (9.84 ft/s)
---	315 (12.40)	
---	510 (20.08)	
---	140 (5.51)	$v_L = 25 \text{ m/s}$ (82.02 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Thermowells with Ø 12 x 2.5 mm (0.47 x 0.10 inch), Ø 14 x 2.5 mm (0.55 x 0.10 inch), dimensions in mm (inch)



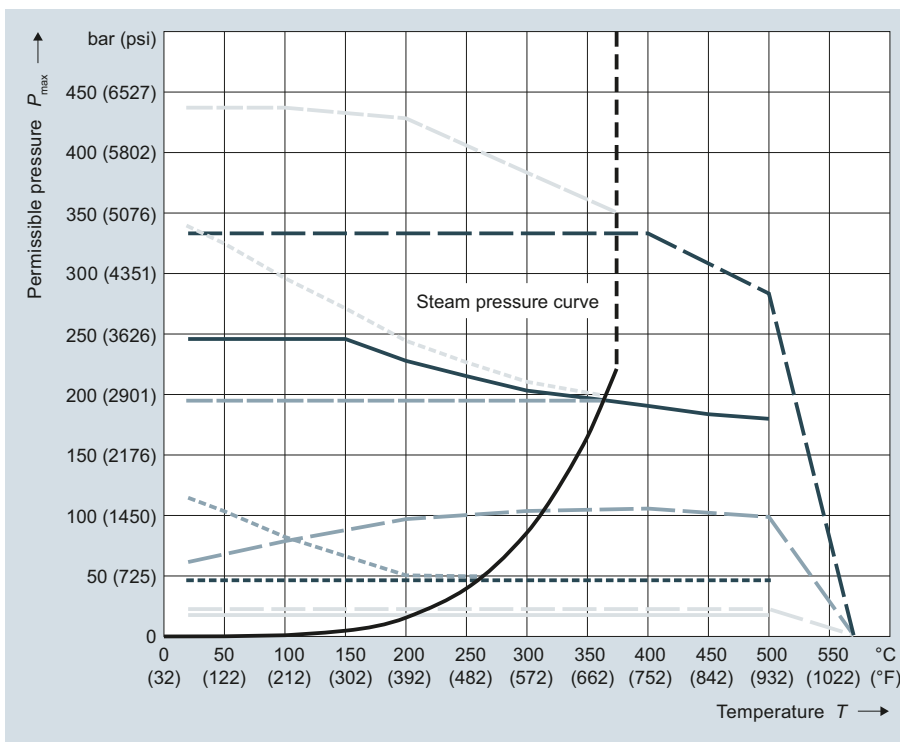
Form 4/4F Ø24 (0.94); C=65 (2.56)
Material No. 1.4571

	U	Speed v
---	140/510 (5.51/20.08)	$v_w = 5 \text{ m/s}$ (16.40 ft/s)
---	315 (12.40)	
---	140 (5.51)	$v_L = 40 \text{ m/s}$ (131.20 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Form 4/4F Ø24 (0.94); C=65 (2.56)
Material No. 1.7335

	U	Speed v
---	140 (5.51)	$v_w = 5 \text{ m/s}$ (16.40 ft/s)
---	315 (12.40)	
---	510 (20.08)	
---	140 (5.51)	$v_L = 40 \text{ m/s}$ (131.20 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Thermowells with Ø 24 mm (0.95 inch), C= 65 mm (2.60 inch), dimensions in mm (inch)



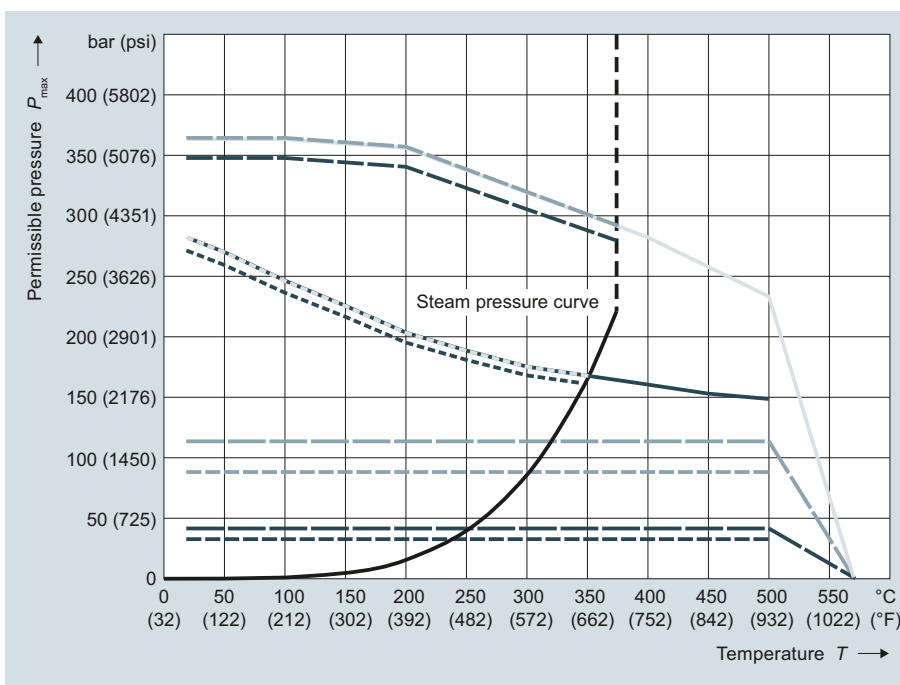
Form 4/4F Ø18 (0.71); C=65 (2.56)
Material No. 1.4571

	U	Speed v
---	140/315 (5.51/12.40)	$v_w = 5$ m/s (16.40 ft/s)
---	510 (20.08)	
---	140 (5.51)	$v_L = 40$ m/s (131.20 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Form 4/4F Ø18 (0.71); C=65 (2.56)
Material No. 1.7335

	U	Speed v
---	140/315 (5.51/12.40)	$v_w = 5$ m/s (16.40 ft/s)
---	510 (20.08)	
---	140 (5.51)	$v_L = 40$ m/s (131.20 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Thermowells with Ø 18 mm (0.71 in), C= 65 mm (2.60 inch), dimensions in mm (inch)



Form 4/4F Ø24 (0.94); C=125 (4.92)
Material No. 1.4571

	U	Speed v
---	140/315 (5.51/12.40)	$v_w = 5$ m/s (16.40 ft/s)
---	510 (20.08)	
---	140 (5.51)	$v_L = 40$ m/s (131.20 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Form 4/4F Ø24 (0.94); C=125 (4.92)
Material No. 1.7335

	U	Speed v
---	140/315 (5.51/12.40)	$v_w = 5$ m/s (16.40 ft/s)
---	510 (20.08)	
---	140 (5.51)	$v_L = 40$ m/s (131.20 ft/s)
---	315 (12.40)	
---	510 (20.08)	

Thermowells with Ø 24 mm (0.95 inch), C= 125 in (4.92 in), dimensions in mm (inch)

Temperature Measurement

SITRANS TS

Technical description

Thermowell calculation

Properly applied load diagrams will provide a sufficient degree of safety for the most common thermowell configurations.

However, there are cases in which operating conditions deviate too greatly from standard parameters. In this case, a customized thermowell calculation may be required.

Another reason for doing this calculation is the fact that flowing media can create turbulence at the tip of the thermowell under certain conditions. The thermowell will then vibrate and may even be destroyed if not configured correctly. This is the most frequent cause of thermowell failure.

SIEMENS offers the two recognized methods for calculating the thermowell:

- DIN/Dittrich method
- ASME/Murdock method
This method also takes into account turbulence formation on a mathematical level.

Both methods provide a high degree of safety with regard to thermowell configuration, however, they do not provide a guarantee against breakdowns.

Materials

Material descriptions/Standards comparison				Max. temperature [°C (°F)] (unloaded)	Properties	Applications
Mat. No.:	AISI/Trade name:	EN 10028-2:	Description			
1.4404 or 1.4435	AISI 316 L	X2CrNiMo17-12-2	Austenitic stainless steel	600 (1112)	Good acid resistance, resistant against grain boundary corrosion	Chemical industry, waste treatment, paper and cellulose industry, food industry
1.4571	AISI 316 Ti	X6CrNiMoTi 17 12-2	Austenitic stainless steel	800 (1472)	Good acid resistance, resistant against grain boundary corrosion (supported by Ti portion)	Chemical industry, textile industry, paper and cellulose industry, water supply, food and pharmaceuticals
1.5415	A 204 size A	16Mo3	Carbon steel, high-alloy	500 (932)	Resistant at higher temperatures, well suited for welding	Steam turbines, steam lines, water pipes
1.7335	A 182 F11	13CrMo4-5	Carbon steel, high-alloy	540 (1004)	Resistant at higher temperatures, well suited for welding	Steam turbines, steam lines, water pipes
1.4841	SS 314	X15CrNiSi25-20	Austenitic heat-resistant stainless steel	1150 (2102)	Resistant at high temperatures, also resistant against low-O ₂ and nitrogen-containing gases.	Flue gas, petrochemical industry, chemicals industry, power plants
1.4762	446	X10CrAl24	Ferritic heat-resistant steel	1150 (2102)	Resistant at high temperatures, in oxidizing and reducing sulphur-containing atmosphere	Chemical industry, power plants, steel industry, waste gas treatment
2.4816	Inconel 600	NiCr15Fe	Nickel-Chrome alloy	1150 (2102)	Resistant at high temperatures, resistant against chlorine-induced cold crack corrosion	Chemical industry, petrochemical industry, food industry
1.4876	Incoloy 800	X10NiCrAlTi32-21	Austenitic heat-resistant stainless steel	1100 (2012)	Excellent resistance against oxidation and carbonization at high temperatures, good corrosion resistance	O&G industry, waste gas treatment, power plants (steam boiler, heat exchanger), applications using aggressive fluids
2.4819	Hastelloy C 276	NiMo16Cr15W	Nickel-Chrome-Molybdenum alloy	1100 (2012)	Resistant at high temperatures, in oxidizing and reducing atmosphere, resistant against pitting and crevice corrosion, good corrosion resistance after welding	Chemicals industry, paper and cellulose industry, waste treatment, waste incinerators, emissions controls, shipbuilding and offshore industry
2.4360	Monel 400	NiCu30Fe	Nickel-Copper alloy	500 (932)	Excellent corrosion resistance, particularly against chlorine-induced cold crack corrosion	Chemical industry, offshore industry, nuclear technology, petrochemical industry

Where cost-intensive materials are used with flange thermowells, cost savings can be achieved by using a so-called flanged wheel. A thin disc of the material which comes into contact with media is applied prior to the flange (ordinary stainless steel).

Materials sensor tube/measuring inserts:

- SITRANS TSinsert, TS100, TS200
 - Resistance thermometer Cr-Ni-Mo
 - Thermocouples 2.4816/Inconel600

Vibration resistance of measuring insert, cable sensor

Similar to the thermowell, inner (Karman vortices) and outer (plant) vibrations also affect the measuring insert. For this reason, a special assembly of measurement elements is required. Other than a few exceptions for cable and compact thermometers, Siemens only produces sensors based on a mineral-insulated cable. Together with precautions taken when installing the measuring element, the Siemens basic version already exceeds EN 60751 by more than a factor of 3. Pursuant to the measurement methods of this standard, the following values are obtained (tip-tip):

- 10 g: Basic version and expanded measuring range
- 60 g: Increased vibration-resistance and thermocouple

Bending ability of measuring insert/cable sensor

All Siemens measuring inserts SITRANS TSinsert are made with a mineral-insulated cable (MIC). The same applies to a portion of the cable and compact thermometer. In addition to the properties already described, another advantage of the MIC is its bending ability. This makes it possible to install these thermometers even in difficult to access areas. Please ensure that you are not below the following bending radius:

Ø MIC [mm (inch)]	$R_{min} = 4x \text{ Ø MIC [mm (inch)]}$
3 (0.12)	12 (0.48)
6 (0.24)	24 (0.95)

Where a smaller bending radius is required due to installation conditions, subsequent testing of the insulation resistance is recommended.

Electrical stability

Insulation resistance

The insulation resistance between each measuring circuit and the fitting is tested at a voltage of 500 V DC at room temperature.

$R_{iso} \geq 100 \text{ M}\Omega$

Due to the property of the mineral-insulated cable, the insulation resistance decreases as temperature increases. Because of the special production method, it is, however, possible to achieve very good values even at high temperatures.

Line resistance

When connected to two-wire systems, the line resistance is included in the measurement result. The following rule of thumb can be used:

- Ø Measuring insert 3 mm (0.12 inch) 5 Ω /m or 12.8 °C (55.04 °F)
- Ø Measuring insert 6 mm (0.24 in) 2.8 Ω /m or 44.78 (44.78 °C)

For this reason a connection to three- or four-wire systems is highly recommended.

Approvals

Explosion protection according to ATEX and IECEx:

Designator	Addition	Type of protection	Ex-identifier	For zone
TSinsert	E01	Intrinsic safety "ia", "ic"	II 1 D Ex ia IIIC T 200 °C Da II 1 G Ex ia IIC T6/T4...T1 Ga II 3 G Ex ic IIC T6/T4...T1 Gc	20 0 2
	E02	-		
	E03	for SITRANS TS500 with protection type Ex d		
	E04	-		
TS100	E01	Intrinsic safety "ia", "ic"	II 1 D Ex ia IIIC T 200 °C Da II 1 G Ex ia IIC T6/T4...T1 Ga II 3 G Ex ic IIC T6/T4...T1 Gc	20 0 2
	E02, E03, E04	-		
TS200	E01	Intrinsic safety "ia", "ic"	II 1 D Ex ia IIIC T 200 °C Da II 1 G Ex ia IIC T6/T4...T1 Ga II 3 G Ex ic IIC T6/T4...T1 Gc	20 0 2
	E02, E03, E04	-		
TS500	E01	Intrinsic safety "ia", "ic"	II 1/2 D Ex ia/ib IIIC T200 °C Da/Db II 1/2 G Ex ia/ib IIC T6/T4...T1 Ga/Gb II 3 G Ex ic IIC T6/T4...T1 Gc	20*/21 0*/1 2
	E02	-		
	E03	Flameproof enclosure "d" Dust protection by enclosure "t" only in combination with connection heads code AG0, AH0, AU0, AV0, without cable gland	II 1/2 G Ex d IIC T6,T4,T3 II 1/2 D Ex tD A21 IP65 T85, 100, 150 °C	0*/1 20*/21
	E04	Non-sparking "n"	II 3 G Ex nA IIC T6/T4...T1 Gc	2

* Up to process connection

Pressure equipment directive:

This device is not included in the pressure device guideline; classification according to pressure device guideline (PED 97/23/EC), Directive 1/40; article 1, paragraph 2.1.4

In addition, statutory, standards-based or operating specifications also require additional testing. The results are certified in certificates as per EN 10204:

- As per EN 10204-2.1, order conformity (C35)
Certificate in which Siemens confirms that the delivered products correspond with the requirements of the order, without indicating test results. The testing does not have to be carried out on the delivered devices.
- As per EN 10 204-3.1
Certificate in which Siemens confirms that the delivered products meet the requirements set out in the order, with indication of the specific test results. Testing is carried out by an organization which is independent of production. The inspection certificate 3.1 replaces 3.1.B of the previous edition.
- Material certificate for parts which come into contact with media (C12)
This certificate confirms the properties of the material and warrants traceability up to the melting batch.
- Pressure-resistant (C31)
Hydrostatic pressure test on thermowell as per customer specifications. Where operating pressure is not specified, testing is carried out using the nominal pressure of the process connection.
- Helium leak test (C32)
This test can be used to detect even the smallest leaks in thermowells and welded seams.
- Dye penetration test (C33)
The dye penetration method can detect cracks and other surface defects.
- Comparative test (calibration) (Y33)
The test object is measured in at an equalized temperature level against a highly precise thermometer, and the measured values of test object and normal values are documented. However, calibration requires the measuring insert to be of a certain minimum length.
Measuring inserts can be calibrated together with the associated transmitter. Calibration values can be stored in the transmitter in order to increase the accuracy of the system.
- As per EN 10204-3.2
This acceptance certificate can be prepared on request, together with an acceptance representative of the ordering party or a representative indicated as per official requirements (e.g. TÜV) It confirms that the delivered products meet the requirements set out in the order; it also contains the test results.

Temperature Measurement

SITRANS TS

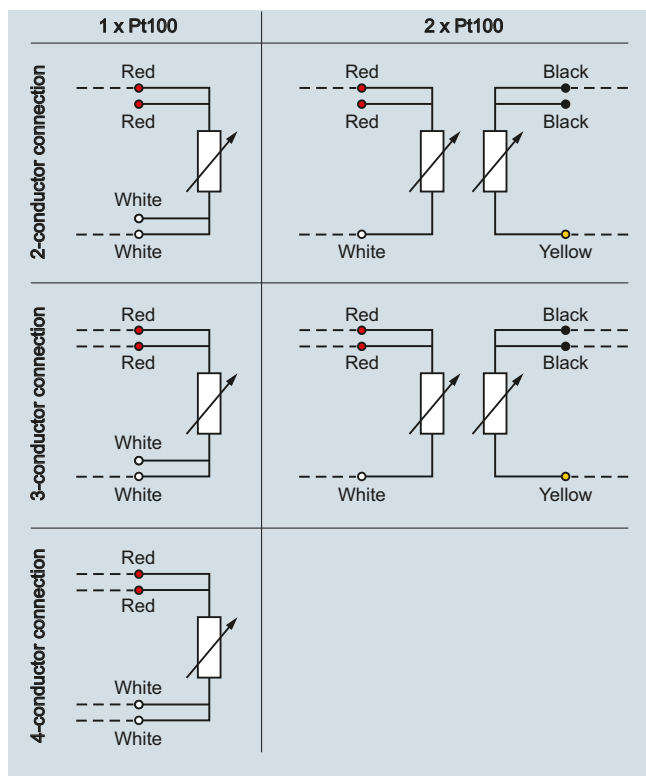
Technical description

Schematics

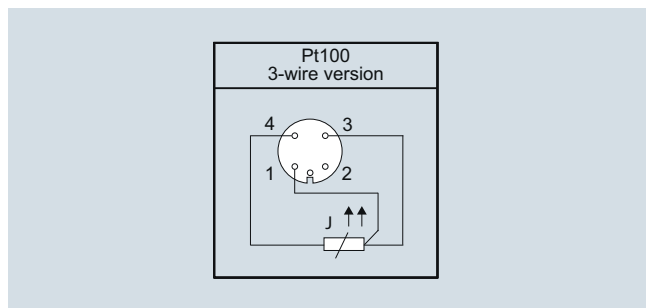
Resistance thermometer

SITRANS TS insert measuring inserts are designed as a four-wire system for single Pt100 if not mentioned differently. This makes it possible to implement all of the aforementioned connection types.

Double Pt100 measuring inserts (for 6 mm OD only) are designed as a three-wire system.

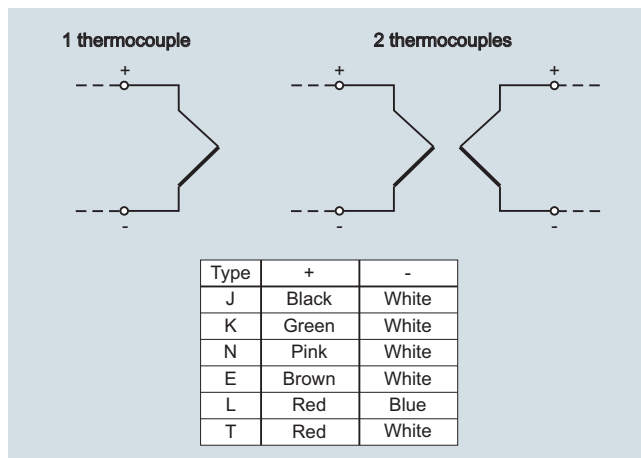


Schematics 1 x Pt100-2W up to 2 x Pt100-4W



Connection diagram for round connector M12 x 1, 4-pole

Thermocouples



Circuit diagram for thermocouple

Where thermocouples are used, the use of head transmitters offers particular advantages: The cold junction is already integrated into the universal transmitter. There is no need for expensive thermo or extension cable. This also removes a number of possible error sources. The weak millivolt signal of the thermocouple is already converted into a stable and temperature-linear DC or bus signal on site. This drastically reduces the effects of electromagnetic factors on the measurement result.

If a head transmitter is not installed, the sensor feed line consists either of the appropriate thermo or extension leads. The thermo line is made from the thermo material of the relevant thermocouple, while the extension lead uses a cost-effective substitute material. The extension cable behaves similar to a thermo line at an electrical level, within a limited temperature range of up to 200°C.

A wide spectrum of color coding is available for thermocouples on an international level. This must be taken into account during the electrical connecting.

Country	International/ Germany		North America			UK/ Czech Republic			
	Jacket +	-	Jacket +	-	Jacket +	-	Jacket +	-	
Standard	Not intrinsically safe ¹⁾		Extension lead ²⁾			BS 1843			
N	PN	PN	WH	OG	OG	RD	OG	OG	BU
K	GN	GN	WH	YE	YE	RD	RD	BR	BU
J	BK	BK	WH	BK	WH	RD	BK	YE	BU
T	BR	BR	WH	BU	BU	RD	BU	WH	BU
E	VT	VT	WH	VT	VT	RD	BR	BR	BU
R+S	OG	OG	WH	BK	RD	GN	WH	BU	
B	GY	GY	WH	GY	GY	RD	-	-	-

¹⁾ With an intrinsically safe line as per IEC 584-3, the sheath is always blue.

²⁾ For thermo lines as per ANSI MC96, the sheath is always blue.

Country	Netherlands		Japan			France			
	Jacket +	-	Jacket +	-	Jacket +	-	Jacket +	-	
Standard	DIN 43714		ISC 1610-198			NF C42-323			
N	GN	RD	GN	BU	RD	WH	VT	VT	YE
K	BU	RD	BU	YE	RD	WH	BK	BK	YE
J	BR	RD	BR	BR	RD	WH	BU	BU	YE
T	BK	RD	BK	VT	RD	WH	OG	OG	YE
E	WH	RD	WH	BK	RD	WH	GN	GN	YE
R+S	GY	RD	GY	GY	RD	WH	-	-	-
B	GN	RD	GN	BU	RD	WH	VT	VT	YE

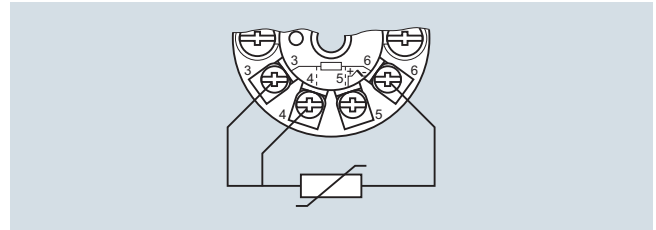
Abbreviation for colors

BK: black	BR: brown	BU: blue	GD: gold	GN: green
GY: gray	OG: orange	PN: pink	RD: red	SR: silver
TQ: turquoise	VT: violet	WH: white	YE: yellow	

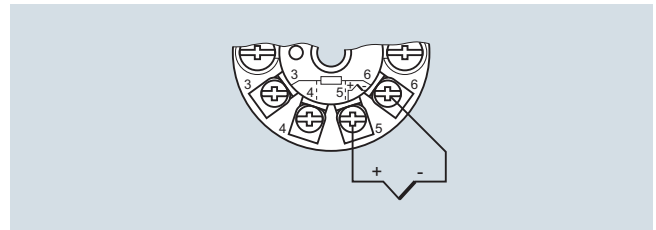
Transmitters

Where SITRANS TH transmitters are used in the connection head of the temperature sensor, connection takes place according to the following pattern

SITRANS TH100/TH200/TH300

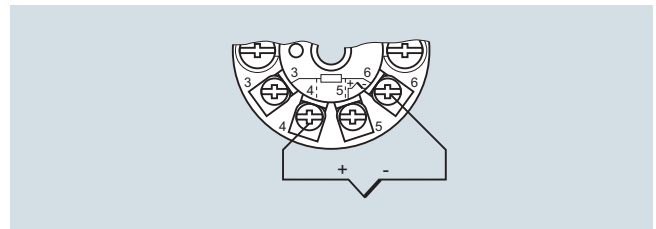


Resistance thermometer

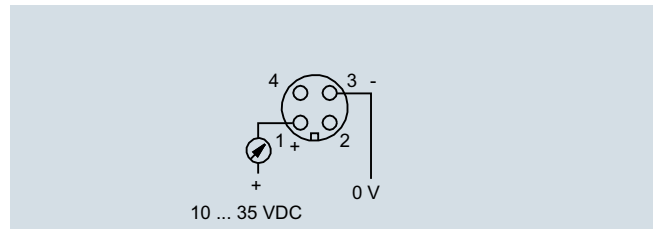


Thermocouples

SITRANS TH400



SITRANS TH100SLIM



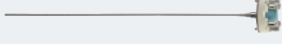


In addition, our transmitters also allow for a large number of other possible connections (e.g. difference, average, two sensors). More information can be obtained at:

<http://www.siemens.com/temperature>



Temperature Measurement

SITRANS TS

Detailed product overview

Type	TSinsert	TS100	TS200
Description	Measuring insert	Temperature sensors in cable version	Temperature sensors in compact version
Application	Replaceable	Universal use	Universal use
Version	Mineral-insulated version	Mineral-insulated version	Mineral-insulated version
Type	in European or American type	For unfavorable space conditions	For unfavorable space conditions
Image			
Catalog page	2/162	2/110	2/114
Order	Nr. 7MC70*	7MC711*	7MC72*
Wetted material	Cr-Ni-Mo (RTD); 2.4816 (TC) (Cr-Ni-Mo; Inconel600)	Cr-Ni-Mo (RTD); 2.4816 (TC) (Cr-Ni-Mo; Inconel600)	Cr-Ni-Mo (RTD); 2.4816 (TC) (Cr-Ni-Mo; Inconel600)
Thermowell types	To order separately	Without/with separate thermowell	Without/with separate thermowell
Process connections	-	<ul style="list-style-type: none"> Compression fittings Soldering nipple: <ul style="list-style-type: none"> - G 1/4, G 1/2 - 1/2 NPT - M 8x1, M18x1.5 Surface connection piece for installation on surfaces/tubes 	<ul style="list-style-type: none"> Compression fittings Soldering nipple: <ul style="list-style-type: none"> - G 1/4, G 1/2 - 1/2 NPT - M 8x1, M18x1.5 Surface connection piece for installation on surfaces/tubes
Sensor elements	Pt100 + thermocouples	Pt100 + thermocouples	Pt100 + thermocouples
Sensor connection	<ul style="list-style-type: none"> • 1 x 4 wire • 2 x 3 wire 	<ul style="list-style-type: none"> • 1 x 4 wire • 2 x 3 wire 	<ul style="list-style-type: none"> • 1 x 4 wire • 2 x 3 wire
Sensor accuracy	<ul style="list-style-type: none"> • Class AA • Class A • Class B • Class 1 • Class 2 	<ul style="list-style-type: none"> • Class AA • Class A • Class B • Class 1 • Class 2 	<ul style="list-style-type: none"> • Class AA • Class A • Class B • Class 1 • Class 2
Connection heads	Type B (Type A flameproof)	Cable, optional with misc. plugs	<ul style="list-style-type: none"> • flying leads • misc. plugs
Explosion protection, (ATEX IECEx)	Intrinsic safety "ia", "ic" for TS500 in Ex d	Intrinsic safety "ia", "ic"	Intrinsic safety "ia", "ic"
Output signal	Sensor signal: <ul style="list-style-type: none"> • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400) 	Sensor signal	Sensor signal
Application	Spare parts	<ul style="list-style-type: none"> • Machinery and equipment • Bearing temperature • Surfaces 	<ul style="list-style-type: none"> • Machinery and equipment • Bearing temperature • Surfaces
Limit temperat.¹⁾ [°C (°F)]	<ul style="list-style-type: none"> • Pt100 basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type) 	<ul style="list-style-type: none"> • Pt100 basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type) 	<ul style="list-style-type: none"> • Pt100 basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type)
Max. nominal pressure¹⁾ (static pressure at 20°C)	-	Compression fitting max. 5 bar (145 psi)	Compression fitting max. 5 bar (145 psi)
Min. response time t_{0,5}	2 ... 6 s	2 ... 6 s	2 ... 6 s
Degree of protection	IP54	See drawing page 2/79	See drawing page 2/79

¹⁾ Load combinations (temperature, flow, vibration, pressure) can at times significantly restrict these values. Other temperature limits result from e.g. thermowell materials with lower limit values [e.g. 1.4571 pressure resilient, 450 ... 550 °C (842 ... 1022 °F), limit temperature 800 °C (1472 °F)].




Type	TS300 Modular	TS300 Clamp-on
Description	Temperature sensors for food, pharmaceuticals and biotechnology	Temperature sensors for food, pharmaceuticals and biotechnology
Application	Measurements submersed in medium (pipelines and vessels)	Clamp-on measurement of pipe surface temperature
Version	Protective pipe similar to DIN 43772, Type 2F and tapered design	Protective pipe similar to DIN 43772, Type 2F and tapered design
Type		For unfavorable space conditions
Image		
Catalog page	2/118	2/122
Order	7MC8005*	7MC8016
Wetted material	1.4404 or 1.4435 (316L)	1.4404 or 1.4435 (316L)
Thermowell types	Similar to 2F	Similar to 2F
Process connections	DIN 11851, clamp connection (Triclamp/ISO 2852/DIN 32676), Varivent, Ingold connection (Fermenter connection), Neumo Biocontrol, ball weld sleeve, (gaskets are not included in scope of delivery)	Clamp-on connections suitable for the following pipe diameters: <ul style="list-style-type: none"> • Collar 4 ... 57 mm (0.16 ... 2.24 inch) • Tensioning 6 ... 50,8 mm (0.24 ... 2.00 inch) • Tensioning 50 ... 200 mm (1.97 ... 7.87 inch)
Sensor elements	Pt100	Pt100
Sensor connection	<ul style="list-style-type: none"> • 1x4 wire • 2x3 wire 	<ul style="list-style-type: none"> • 1x3 wire
Sensor accuracy	<ul style="list-style-type: none"> • Class A 	<ul style="list-style-type: none"> • Class A • Process-optimized design
Connection heads	Typ B	<ul style="list-style-type: none"> • Typ B
Explosion protection, (ATEX IECEx)	-	-
Output signal	Sensor signal: <ul style="list-style-type: none"> • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400) 	Sensor signal: <ul style="list-style-type: none"> • 4 ... 20 mA TH100slim • HART (TH300) • PA (TH400) • FF (TH400)
Application	Surface roughness: Standard applications $Ra < 1.5 \mu\text{m}$ ($5.9 \cdot 10^{-5}$ inch)	Surface roughness: Standard applications $Ra < 1.5 \mu\text{m}$ ($5.9 \cdot 10^{-5}$ inch)
Limit temperat. ¹⁾ [°C (°F)]	-20 ... +400 °C (-4 ... +752 °F)	-40 ... +150 °C (-40 ... +302 °F)
Max. nominal pressure ¹⁾ (static pressure at 20°C)	0 ... 150 (0 ... 5.91) 50 bar 150 ... 300 (5.91 ... 11.81) 40 bar	No pressure load due to clamp-on principle
Min. response time $t_{0.5}$	20 ... 34 s	4 s (See "Reference conditions SITRANS TS300 Clamp-on" page 2/89)
Degree of protection	IP54 ... IP67 dep. to connection head, see page 2/86	IP65 for pipe collar, IP67 for electrical connection

¹⁾ Load combinations (temperature, flow, vibration, pressure) can at times significantly restrict these values. Other temperature limits result from e.g. thermowell materials with lower limit values [e.g. 1.4571 pressure resilient, 450 ... 550 °C (842 ... 1022 °F), limit temperature 800 °C (1472 °F)].



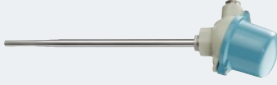
Temperature Measurement

SITRANS TS

Detailed product overview

Type	TS500 for installation	TS500 Type 2	TS500 Type 2N
Description	Temperature sensors for the process industry (vessels and pipings)	Temperature sensors for the process industry (vessels and pipings)	Temperature sensors for the process industry (vessels and pipings)
Application	Temperature sensors for the installation of existing thermowells	Tubular version for minimal to medium stress	Tubular version for minimal to medium stress
Version	Suitable for thermowells as per DIN 43772 as well as ASME B40.9-2001	Thermowell as per DIN43722, Type 2 without process connection	Thermowell Type 2N similar to DIN 43772, screwed in
Type	With extension <ul style="list-style-type: none"> • European type • American type 	<ul style="list-style-type: none"> • Without extension, plug-in • Use with moveable compression fittings 	Without extension
Image			
Catalog page	2/158	2/126	2/130
Article No.	Nr. 7MC750*	7MC751*-0*(A/B)**-0***	7MC751*-1****-0***
Wetted material	None: Measuring insert made of 1.4571, 1.4404 or 1.4435 (RTD); 2.4816 (TC) (316L; Inconel600)	1.4404 or 1.4435; 1.4571 (316L; 316TI)	1.4404 or 1.4435; 1.4571 (316L; 316TI)
Thermowell types	To order separately	Form 2	Form 2N (similar to form 2)
Process connections	Connection to thermowell: <ul style="list-style-type: none"> • M14x1.5 • M18x1.5 • G 1/2 • 1/2 NPT 	Compression fittings <ul style="list-style-type: none"> • G 1/2 • 1/2 NPT 	<ul style="list-style-type: none"> • G 1/2 • 1/2 NPT
Insertion length	<ul style="list-style-type: none"> • 110 mm (4.33 inch) 2.5 inch 15 inch • 140 mm (5.51 inch) 4 inch 18 inch • 200 mm (7.87 inch) 6 inch 24 inch • 260 mm (10.24 inch) 9 inch • 410 mm (16.14 inch) 12 inch 	Variable	<ul style="list-style-type: none"> • 100 mm (3.94 inch) • 160 mm (6.30 inch) • 230 mm (9.06 inch) • 360 mm (14.17 inch) • 510 mm (20.08 inch)
Neck tube length	as per DIN 43772	as per DIN 43772	not adjustable X=20 mm (0.79 inch)
Sensor elem.	Pt100 + thermocouples	Pt100 + thermocouples	Pt100 + thermocouples
Sensor connection	<ul style="list-style-type: none"> • 1 x 4 wire • 2 x 3 wire 	<ul style="list-style-type: none"> • 1 x 4 wire • 2 x 3 wire 	<ul style="list-style-type: none"> • 1 x 4 wire • 2 x 3 wire
Sensor accuracy	<ul style="list-style-type: none"> • Class AA • Class A • Class B • Class 1 • Class 2 	<ul style="list-style-type: none"> • Class AA • Class A • Class B • Class 1 • Class 2 	<ul style="list-style-type: none"> • Class AA • Class A • Class B • Class 1 • Class 2
Conn. heads	Type B (Type A for Ex d versions)	Type B (Type A for Ex d versions)	Type B (Type A for Ex d versions)
Explosion protection, (ATEX IECEx)	<ul style="list-style-type: none"> • Intrinsic safety "ia", "ic" • Flameproof enclosure "d" • Non sparking "n" 	<ul style="list-style-type: none"> • Intrinsic safety "ia", "ic" • Flameproof enclosure "d" • Non sparking "n" 	<ul style="list-style-type: none"> • Intrinsic safety "ia", "ic" • Flameproof enclosure "d" • Non sparking "n"
Output signal	Sensor signal: <ul style="list-style-type: none"> • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400) 	Sensor signal: <ul style="list-style-type: none"> • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400) 	Sensor signal: <ul style="list-style-type: none"> • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400)
Application	Pressure vessel and piping	Pressure vessel and piping	Pressure vessel and piping
Limit temperature¹⁾ [°C (°F)]	<ul style="list-style-type: none"> • Pt100 Basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type) 	<ul style="list-style-type: none"> • Pt100 Basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type) 	<ul style="list-style-type: none"> • Pt100 Basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type)
Max. nominal pressure¹⁾ (static pressure at 20°C), dimensions in mm (inch)	s. thermowell	Tube Ø9 (0.35): <ul style="list-style-type: none"> • 0 ... 150 (0 ... 5.91) 50 bar • 150 ... 300 (5.91 ... 11.81) 40 bar • Compression fitting 5 bar Tube Ø12 (0.47): <ul style="list-style-type: none"> • 0 ... 150 (0 ... 5.91) 75 bar • 150 ... 300 (5.91 ... 11.81) 60 bar • Compression fitting 5 bar 	Tube Ø9 (0.35): <ul style="list-style-type: none"> • 0 ... 150 (0 ... 5.91) 50 bar • 150 ... 300 (5.91 ... 11.81) 40 bar
Min. response time t_{0,5}	s. thermowell	20 ... 45 s	20 ... 34 s
Degree of prot.	IP54 ... IP67 dep. on connection head see page 2/86	IP54 ... IP67 dep. on connection head see page 2/86	IP54 ... IP67 dep. on connection head see page 2/86

¹⁾ Load combinations (temperature, flow, vibration, pressure) can at times significantly restrict these values. Other temperature limits result from e.g. thermowell materials with lower limit values [e.g. 1.4571 pressure resilient, 450 ... 550 °C (842 ... 1022 °F), limit temperature 800 °C (1472 °F)].



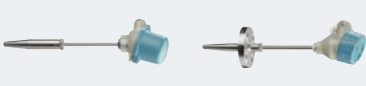
Type	TS500 Type 2G	TS500 Type 2F	TS500 Type 3
Description	Temperature sensors for the process industry (vessels and pipings)	Temperature sensors for the process industry (vessels and pipings)	Temperature sensors for the process industry (vessels and pipings) quicker than form 2
Application	Pipe version for minimal to medium stress	Pipe version for minimal to medium stress	Pipe version for minimal to medium stress
Version	Thermowell as per DIN 43722, Type 2G, screwed in	Thermowell as per DIN 43722, Type 2F with flange	Thermowell as per DIN 43722, Type 3 without process connection, improved response time
Type	with extension	with extension	<ul style="list-style-type: none"> Without extension, plug-in Use with moveable compression fittings
Image			
Catalog page	2/134	2/138	2/142
Article No.	7MC751*-1*(A/B)**-1***	7MC751*-2*(A/B)**-1***	7MC751*-0*K**0***
Wetted mater.	1.4404 or 1.4435; 1.4571 (316L; 316TI)	1.4404 or 1.4435; 1.4571 (316L; 316TI)	1.4404 or 1.4435; 1.4571 (316L; 316TI)
Therm. types	Form 2G	Form 2F	Form 3
Process connections	Welded threads: <ul style="list-style-type: none"> G 1 G 1/2 1/2 NPT 	Welded flange <ul style="list-style-type: none"> DN 25, PN 40 1RF150 1.5RF150 1.5RF300 	Compression fittings <ul style="list-style-type: none"> G 1/2 1/2 NPT
Insertion length	<ul style="list-style-type: none"> 160 mm (6.30 inch) 250 mm (9.84 inch) 400 mm (15.75 inch) 	<ul style="list-style-type: none"> 225 mm (8.86 inch) 315 mm (12.40 inch) 465 mm (18.31 inch) 	<ul style="list-style-type: none"> 225 mm (8.86 inch) 315 mm (12.40 inch) 465 mm (18.31 inch)
Neck tube length	As per DIN 43772	As per DIN 43772	As per DIN 43772
Sensor elements	Pt100 + thermocouples	Pt100 + thermocouples	Pt100 + thermocouples
Sensor connection	<ul style="list-style-type: none"> 1 x 4 wire 2 x 3 wire 	<ul style="list-style-type: none"> 1 x 4 wire 2 x 3 wire 	<ul style="list-style-type: none"> 1 x 4 wire 2 x 3 wire
Sensor accuracy	<ul style="list-style-type: none"> Class AA Class A Class B Class 1 Class 2 	<ul style="list-style-type: none"> Class AA Class A Class B Class 1 Class 2 	<ul style="list-style-type: none"> Class AA Class A Class B Class 1 Class 2
Connection heads	Type B (Type A for Ex d versions)	Type B (Type A for Ex d versions)	Type B (Type A for Ex d versions)
Explosion protection, (ATEX IECEx)	<ul style="list-style-type: none"> Intrinsic safety "ia", "ic" Flameproof enclosure "d" Non sparking "n" 	<ul style="list-style-type: none"> Intrinsic safety "ia", "ic" Flameproof enclosure "d" Non sparking "n" 	<ul style="list-style-type: none"> Intrinsic safety "ia", "ic" Flameproof enclosure "d" Non sparking "n"
Output signal	Sensor signal: <ul style="list-style-type: none"> 4 ... 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400) 	Sensor signal: <ul style="list-style-type: none"> 4 ... 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400) 	Sensor signal: <ul style="list-style-type: none"> 4 ... 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400)
Application	Pressure vessel and piping	Pressure vessel and piping	Pressure vessel and piping
Limit temperat.¹⁾ [°C (°F)]	<ul style="list-style-type: none"> Pt100 Basis: -50 ... +400 (-58 ... +752) Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type) 	<ul style="list-style-type: none"> Pt100 Basis: -50 ... +400 (-58 ... +752) Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type) 	<ul style="list-style-type: none"> Pt100 Basis: -50 ... +400 (-58 ... +752) Pt100 ext. measuring range: -196 ... +600 (-321 ... +1112) Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type)
Max. nominal pressure¹⁾ (static pressure at 20°C), dimensions in mm (inch)	<ul style="list-style-type: none"> Tube Ø9 (0.35): <ul style="list-style-type: none"> 0 ... 150 mm (0 ... 5.91 inch) 50 bar 150 ... 300 (5.91 ... 11.81) 40 bar Compression fitting 5 bar Tube Ø12 (0.47): <ul style="list-style-type: none"> 0 ... 150 (0 ... 5.91) 75 bar 150 ... 300 (5.91 ... 11.81) 60 bar 	<ul style="list-style-type: none"> Tube Ø9 (0.35): <ul style="list-style-type: none"> 0 ... 150 mm (0 ... 5.91 inch) 50 bar 150 ... 300 (5.91 ... 11.81) 40 bar Tube Ø12 (0.47): <ul style="list-style-type: none"> 0 ... 150 (0 ... 5.91) 75 bar 150 ... 300 (5.91 ... 11.81) 60 bar Note restriction imposed by PN of the flange 	<ul style="list-style-type: none"> Tube Ø12 (0.47): <ul style="list-style-type: none"> 0 ... 200 (0 ... 7.87) 75 bar 200 ... 300 mm (7.87 ... 11.81) 60 bar Compression fitting 5 bar
Min. response time t_{0,5}	20 ... 34 s	20 ... 34 s	7 ... 15 s
Degr. of protec.	IP54 ... IP67 dep. on connection head see page 2/86	IP54 ... IP67 dep. on connection head see page 2/86	IP54 ... IP67 dep. on connection head see page 2/86

¹⁾ Load combinations (temperature, flow, vibration, pressure) can at times significantly restrict these values. Other temperature limits result from e.g. thermowell materials with lower limit values [e.g. 1.4571 pressure resilient, 450 ... 550 °C (842 ... 1022 °F), limit temperature 800 °C (1472 °F)].

Temperature Measurement

SITRANS TS

Detailed product overview

Type	TS500 Type 3G	TS500 Type 3F	TS500 Type 4/4F
Description	Temperature sensors for the process industry (vessels and pipings) faster as form 2	Temperature sensors for the process industry (vessels and pipings) faster as form 2	Temperature sensors for the process industry (vessels and pipings) Quick-response version available
Applic. area	Tubular version for minimal to medium stress	Tubular version for minimal to medium stress	Tubular version for medium to highest stress
Version	Thermowell as per DIN 43722, Type 3G, screwed in	Thermowell as per DIN 43722, Type 3F with flange	Thermowell to DIN 43722: • Type 4 for weld-in • Type 4F with flange
Type	with extension	with extension	with extension
Image			
Catalog page	2/146	2/150	2/154
Article No.	7MC751*-1*K**-1***	7MC751*-2*K**-1***	7MC752*
Wetted material	1.4404 or 1.4435; 1.4571 (316L; 316TI)	1.4404 or 1.4435; 1.4571 (316L; 316TI)	Form 4F: 1.4404 or 1.4435; 1.4571 (316L; 316TI) Additional Form 4: 1.7335; 1.5415(A 182 F11; A 204 Size A)
Thermowell types	Form 3G	Form 3F	• Form 4 • Form 4F
Process connections	Welded threads: • G 1 • G 1/2 • 1/2 NPT	Welded flange • DN 25, PN 40 • 1RF150 • 1.5RF150 • 1.5RF300	For 4 for welding in, Form 4F with flange: • DN 25, PN 40 • 1RF150 • 1RF300 • 1.5RF150 • 1.5RF300
Insertion length	• 160 mm (6.30 inch) • 220 mm (8.66 inch) • 280 mm (11.02 inch)	• 225 mm (8.86 inch) • 285 mm (11.22 inch) • 345 mm (13.58 inch)	Form 4F: as per customer-specification Form 4: • 110 mm (4.33 inch) fast • 140 mm (5.51 inch) fast/normal • 200 mm (7.87 inch) fast/normal • 260 mm (10.23 inch) normal
Neck tube length	As per DIN 43772	As per DIN 43772	As per DIN 43772
Sensor elem.	Pt100 + thermocouples	Pt100 + thermocouples	Pt100 + thermocouples
Sensor connection	• 1 x 4 wire • 2 x 3 wire	• 1 x 4 wire • 2 x 3 wire	• 1 x 4 wire • 2 x 3 wire
Sensor accuracy	• Class AA • Class A • Class B • Class 1 • Class 2	• Class AA • Class A • Class B • Class 1 • Class 2	• Class AA • Class A • Class B • Class 1 • Class 2
Conn. heads	Type B (Type A for Ex d versions)	Type B (Type A for Ex d versions)	Type B (Type A for Ex d versions)
Explosion prot., Europe	• Intrinsic safety "ia", "ic" • Flameproof enclosure "d" • Non sparking "n"	• Intrinsic safety "ia", "ic" • Flameproof enclosure "d" • Non sparking "n"	• Intrinsic safety "ia", "ic" • Flameproof enclosure "d" • Non sparking "n"
Output signal	Sensor signal: • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400)	Sensor signal: • 4... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400)	Sensor signal: • 4 ... 20 mA (TH100/TH200) • HART (TH300) • PA (TH400) • FF (TH400)
Application	Vessels and pipings	Vessels and pipings	Vessels and pipings
Limit temperat.¹⁾ [°C (°F)]	• Pt100 Basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 °C (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type)	• Pt100 Basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 °C (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type)	• Pt100 Basis: -50 ... +400 (-58 ... +752) • Pt100 ext. measuring range: -196 ... +600 °C (-321 ... +1112) • Thermocouple: -40 ... +1100 (-40 ... +2012) (depends on type)
Max. nominal pressure¹⁾ (static pressure at 20°C), dimensions in mm (inch)	Pipe Ø12 (0.47): • 0 ... 200 • 200 ... 300 75 bar 60 bar	Pipe Ø12 (0.47): • 0 ... 200 • 200 ... 300 Note restriction imposed by PN of the flange 75 bar 60 bar	Mat. (1.4404; 1.4571) : • 65 450 bar • 125 350 bar Mat. (1.7335; 1.5415) : • 65 500 bar • 125 400 bar Form 4F: Note restriction imposed by PN of the flange
Min. response time t_{0,5}	7 ... 15 s	7 ... 15 s	Ø24 mm (0.95 inch): 20 ... 45 s
Deg. of protect.	IP54 ... IP67 dep. on connection head, see page 2/86	IP54 ... IP67 dep. on connection head, see page 2/86	IP54 ... IP67 dep. on connection head, see page 2/86

¹⁾ Load combinations (temperature, flow, vibration, pressure) can at times significantly restrict these values. Other temperature limits result from e.g. thermowell materials with lower limit values [e.g. 1.4571 pressure resilient, 450 ... 550 °C (842 ... 1022 °F), limit temperature 800 °C (1472 °F)].

Old					New													
Length	Material	Number of sensors + Ex		Connection head	Material	PA weights	PA characteristic	Thermowell form	Length of 1st digit	Length of 2nd digit	.	Neck tube	Connection side	Sensor type	Number of sensors		Ex protection	
7MC1006-	■	D	■	1	■													
	1								0	1	-	0	■	A	■			
	2								0	4								
	3								1	0								
	4								2	0								
	5								3	1								
		A													1			
		B													5			
		E													1		-Z	E01
		F													5		-Z	E01
				1										A				
				4										B				
				6										C				
				7										-				
7MC1007-	■	D	■	1	■													
	5								0	4	-	1	■	C	■			
	6								1	2								
	7								2	2								
		A													1			
		B													5			
		E													1		-Z	E01
		F													5		-Z	E01
				1										A				
				4										B				
				6										C				
				7										-				
7MC1008-	■	D	■	1	■													
	6								0	4	-	1	■	C	■			
	7								1	2								
		A													1			
		B													5			
				1										A				
				4										B				
				6										C				
				7										-				

Temperature Measurement

SITRANS TS

Conversion assistance old appliance

Old						New													
Length	Material	Number of sensors + Ex		Connection head		Material	PA weights	PA characteristic	Thermowell form	Length of 1st digit	Length of 2nd digit	.	Neck tube	Connection side	Sensor type	Number of sensors		Ex protection	
7MC1010-	■	■	2	*		7MC752	■	-	0	N	■	■	0	-	■	■	C	■	
	1								A	0			1						
	2								A	0			9						N2D: X45 {Y45:209 mm}
	3								A	0			9						N2D: X45 {Y45:179 mm}
	4								B	0			1						
	5								B	0			9						N2D: X45 {Y45:179 mm}
	6								D	0			1						
	7								D	0			9						N2D: X45 {Y45:179 mm}
	8								E	0			9						N1D: X45 {Y45:119 mm}
		G																	
		F																	
		A																	
		B																	
		E																	-Z E01
		F																	-Z E01
				1										A					
				4										B					
				6										C					
				7										-					
7MC1017-	■	F	■	1	■	7MC751	1	-	2	A	B	■	■	-	9	■	C	■	
	1									0	4								
	2									1	2								
		A																	
		B																	
		E																	-Z E01
		F																	-Z E01
				1										A					
				4										B					
				6										C					
				7										-					
7MC1041-	■	F	■	0	■	7MC751	1	-	2	A	K	■	■	-	1	■	C	■	
	1									1	1								
	2									1	4								
	3									1	7								
		A	A																
		A	B																
		E	A																-Z E01
		E	B																-Z E01
				1										A					
				4										B					
				6										C					
				7										-					

Temperature Measurement
SITRANS TS

Conversion assistance old appliance

Old				New															
	Length	Number of sensors	Connection head	Diameter		Measuring insert type	Sensor	Number of sensors	Length of 1st digit	Length of 2nd digit							Ex protection		
7MC1900-		E	A		7MC701	8	-	1	C	A									
	1										3	3							
	2										4	1							
	3										4	7						-Z	Y44: B=1025 mm
	4										4	7						-Z	Y44: B=1425 mm
7MC1910-		J			7MC701	6	-	1	C										
	1										1	3							
	2										1	7							
	3										2	1							
	4										2	3							
	5										2	5							
	6										2	7							
	7										3	5							
	8										2	0							
		A							A										
		B							D										
7MC1913-		A		2	7MC701	6	-	1	C									-Z	E01
	1										1	3							
	2										1	7							
	3										2	1							
	4										2	3							
	5										2	5							
	6										2	7							
	7										2	0							
	8										3	5							
		A	2						A										
		B	1						D										

Old				New																		
	Length	Type of cable	External diameter of sheath	External diameter of sheath	Nominal length	Sensor	Number of sensors	Connection side										Ex-protection				
7MC2027-			A	0	7MC711	1	-		K	1	1	-	0	A	A	0						
	1									B												
	2									D									-Z	Y44: U=300 mm		
	3									D												
			A																	-Z	J03	
			B																		-Z	S03
			C																		-Z	L03
				1																		
				2																		
				3																		
				4																		

Temperature Measurement

SITRANS TS

Conversion assistance old appliance

2

Old					New														
External diameter of sheath	Material of sheath	Type + number of sensor	Length		External diameter of sheath	Length	Sensor type	Number											Ex-protection
7MC2021-	■	■	-Z		7MC721	2	-	■	■	■	■	5	-	0	A	A	0		
	2							3											
	4							6											
		C								J	1								
		L								J	4								
		E								-	-								
		F								-	-								
		A								K	1								
		B								K	4								
		C																	
		D																	
				A01				C										-Z	Y44: U=250 mm
				A02				F											
				A03				M											
				A04				T											

Old					New															
Length	Number of sensors	External diameter of sheath	Material of sheath		External diameter of sheath	Length	Sensor type	Number											Ex-protection	
7MC2028-	■	A	■	■	7MC721	2	-	■	■	K	■	4	-	0	A	A	0			
	1							D											-Z	Y44: U=300 mm
	2							D												
		C									1									
		D									4									
			1							-										
			2							-										
			3							3										
			4							6										
				1																
				2																

Connection head, Form B	Old	New
<ul style="list-style-type: none"> Made of cast light alloy, with 1 cable bushing and <ul style="list-style-type: none"> Screw cover Standard hinged cover Hinged cover high Made of stainless steel, with 1 cable bushing and screw cover 		
Measuring insert, single	1	A
Measuring insert, single, explosion protection	4	B
Measuring insert, double	6	C
Measuring insert, double, explosion protection	7	-
	A	1
	E	1 and additional E01
	B	5
	F	5 and additional E01

More information

Ordering examples for SITRANS TS100/200

Desired features	Article No.
SITRANS TS100	7MC7111
Sensor diameter	6
Standard length 200 mm (scope of sensor length 101 ... 250 mm)	C
Sensor	A1
flying leads	1
Enclosed compression fitting	A41
Connection cable PVC, 10 m	J10
TAG plate	Y15: TTSA5458

Full article no.:

7MC7111-6CA11-Z A41+J10+Y15
Y15: TTSA5458

Desired features	Article No.
SITRANS TS100	7MC7111
Sensor diameter	6
Standard length 200 mm (scope of sensor length 101 ... 250 mm)	C
Sensor	A1
flying leads	1
Enclosed compression fitting	A41
Connection cable PVC, 10 m	J10
TAG plate	Y15: TTSA5458
Customer-specific length 211 mm	Y44: 211 mm

Full article no.:

7MC7111-6CA11-Z A41+J10+Y15+Y44
Y15: TTSA5458
Y44: 211 mm

Ordering example for SITRANS TS500

Desired features	Article No.
SITRANS TS500	7MC751
Material	1
Process connection	1E
Thermowell form	A
Insertion length U Standard 250 mm (insertion length customer-specific 220 mm)	12
Extension X customer-specific	9
Head	C
Sensor	A
Sensor number/Accuracy	1
Extension X customer-specific	N2D
Insertion length U customer-specific	Y44: 220 mm
Extension length X customer-specific	Y45: 200 mm
Plant calibration per 3-point	Y33: 0°C Y33: 50°C Y33: 150°C

Full article no.:

7MC7511-1EA12-9CA1-Z N2D+Y44+Y45 +Y33+Y33+Y33
Y44: 220 mm
Y45: 200 mm
Y33: 0°C
Y33: 50°C
Y33: 150°C

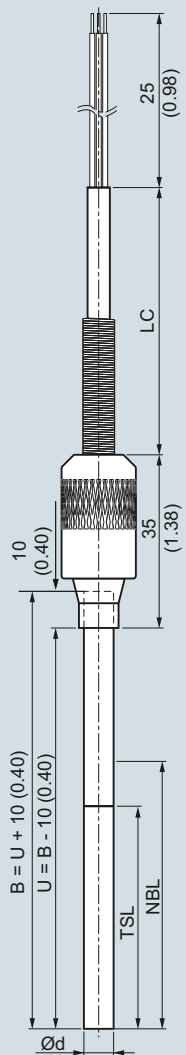
Temperature Measurement

SITRANS TS100

Cable mineral-insulated

Dimensional drawings

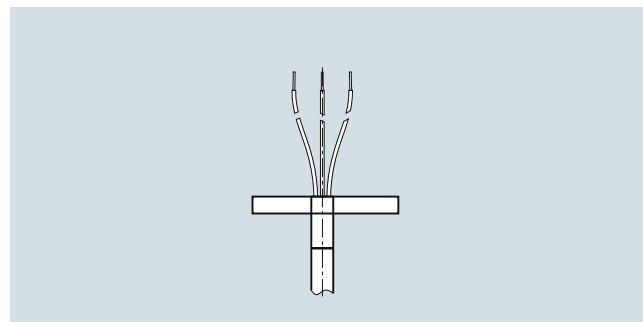
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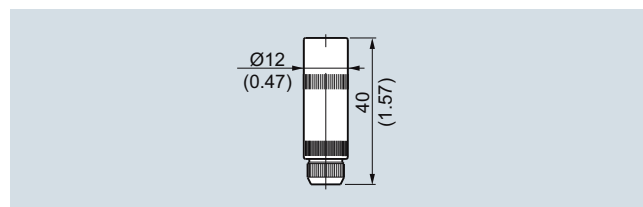
- B Measuring insert length
- Ød Measuring insert outer diameter (6 (0.24))
- LC Cable length
- NBL Non-bending length
- TSL Temperature-sensitive length
- U Insertion length

SITRANS TS100, temperature sensors in cable version, universal use, mineral-insulated version, for unfavorable space conditions, IP54 at sensor/cable transition, dimensions in mm (inch)

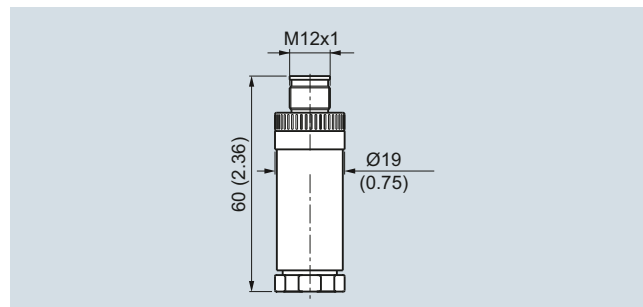
Design of connection side



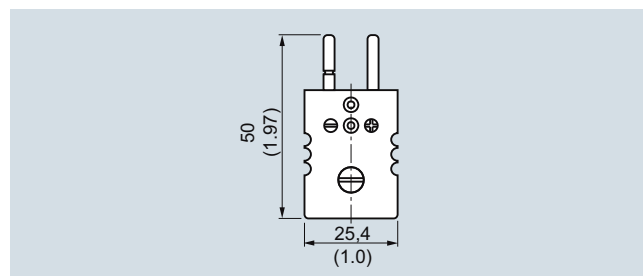
Flying leads, IP00, dimensions in mm (inch)



Coupling LEMO 1S, IP50, dimensions in mm (inch)



M12 plug, IP54, dimensions in mm (inch)



Thermocouple plug, IP20, dimensions in mm (inch)

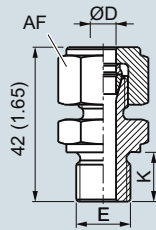
Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS TS100 Temperature sensors in cable version, universal use, mineral-insulated version, for unfavorable space conditions ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7MC7111-	Further designs Add "-Z" to Article No. and specify Order Code.	
Sensor diameter 6 mm (0.24 inch)	6	Customer-specific length of sensor element B, effective length U = B-10 Select range, enter desired length in plain text (No entry = standard length)	Y44
Length of sensor element B, effective length U = B-10; see dimensional drawings page 2/110 200 mm (7.87 inch) 500 mm (19.68 inch) 750 mm (29.53 inch)	C D E	Options Add "-Z" to Article No., add options, separate extensions with "+".	
Customer-specific length of sensor element B, effective length U = B-10; see dimensional drawings page 2/110 enter customer specific length with Y44, see Order Codes below 70 ... 100 mm (2.76 ... 3.94 inch) Initial: 100 mm (3.94 inch) 101 ... 250 mm (3.98 ... 9.84 inch) Initial: 200 mm (7.87 inch) 251 ... 500 mm (9.88 ... 19.68 inch) Initial: 500 mm (19.68 inch) 501 ... 750 mm (19.72 ... 29.53 inch) Initial: 750 mm (29.53 inch) 751 ... 1 000 mm (19.72 ... 39.37 inch) Initial: 1 000 mm (39.37 inch) 1 001 ... 1500 mm (39.4 ... 59.00 inch) Initial: 1 500 mm (59.00 inch)	B C D E F G	Connection cable, type and length Cable type = 1st letter, Length 1 ... 99 m (3.28 ... 324.80 ft) = 2nd + 3rd place e.g.: 34 m (111.55 ft) connection cable PVC (PVC code is J34) with ?? meters connection cable (JJ) PVC/PVC, Operating temperature (-10...+105°C) (14 ... 221 °F) with ?? meters connection cable (SLFP) Silicone/Fluoropolymer, operating temperature -10 ... +80 °C (-14 ... +356 °F) with ?? meters connection cable (TGLV) PTFE/glass fiber/reinforced with stainless steel), Operating temperature (-100...+205°C (148 ... 401°F))	J01 ... J99 S01 ... S99 L01 ... L99
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration-resitant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... 600 °C (-320.8 ... 1 112 °F) Thermocouple Type K, -40 ... +1000 °C (-40 ... +1 832 °F) Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382 °F)	A B C K J	Additional configurations on page after next page! You find ordering examples on page 2/109.	
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)	1 2 3 4 5 6		
Design of connection side Flying leads LEMO coupling 1S M12 connector, not for double Pt100 Thermocouple coupling, from TC-material (2xTC on request)	1 2 3 4		

Temperature Measurement

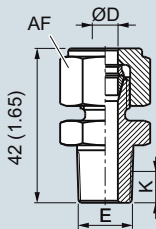
SITRANS TS100

Cable mineral-insulated

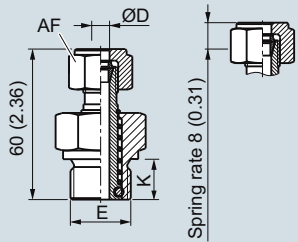
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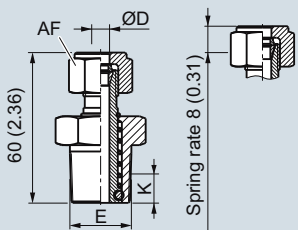
Compression fitting, dimensions in mm (inch)



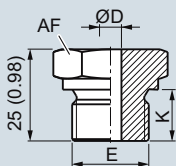
Compression fitting NPT, dimensions in mm (inch)



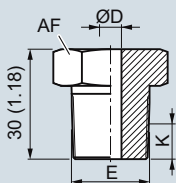
Spring-loaded compression fitting, dimensions in mm (inch)



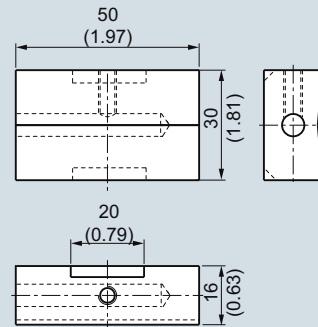
Spring-loaded compression fitting NPT, dimensions in mm (inch)



Soldering nipple, metric, dimensions in mm (inch)



Soldering nipple NPT, dimensions in mm (inch)



Surface connection piece, dimensions in mm (inch)

Selection and Ordering data	Order code
Options	
Add "-Z" to Article No., add options, separate extensions with "+" .	
Process connection	
Soldering nipple G $\frac{1}{4}$ ", enclosed	A20
Soldering nipple G $\frac{1}{2}$ ", enclosed	A21
Soldering nipple NPT $\frac{1}{2}$ ", enclosed	A22
Soldering nipple M18x1.5, enclosed	A23
Compression fitting G $\frac{1}{4}$ ", enclosed	A30
Compression fitting G $\frac{1}{2}$ ", enclosed	A31
Compression fitting NPT $\frac{1}{2}$ ", enclosed	A32
Surface connection piece, enclosed (non Ex)	A50
Explosion protection	
Intrinsic safety "ia", "ic"	E01
Certificates and approvals	
EN10204-3.1 Inspection certificate for materials coming into contact with media	C12
EN10204-3.1 Inspection certificate visual: measurement and functional inspection	C34
EN 10204-2.1: Declaration of compliance with the order	C35
ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C51
Further options	
Stainless steel TAG plate , Enter lettering in plain text	Y15
Plant calibration per 1 point, enter temperature in plain text, Attention: For devices with built-in head transmitters, select test points within the set measurement range	Y33

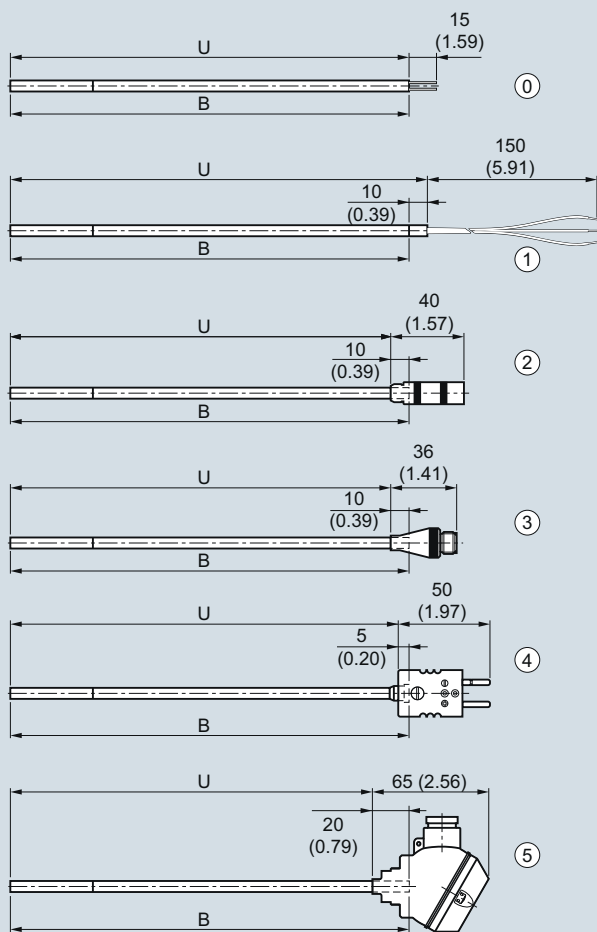
You find ordering examples on page 2/109.

Temperature Measurement

SITRANS TS200

Compact mineral-insulated

Dimensional drawings



B Measuring insert length
H Head height
U Insertion length

① Basic sensor	$U = B$	IP00
① Flying leads	$U = B + 10$ (0.39)	IP00
② LEMO coupling 1S	$U = B - 10$ (0.39)	IP50
③ M12 plugs	$U = B - 10$ (0.39)	IP54
④ Thermocouple coupling	$U = B - 5$ (0.20)	IP20
⑤ Mini connection head	$U = B - 20$ (0.79)	IP54

SITRANS TS200, temperature sensors in cable version, universal use, mineral-insulated version, for unfavorable space conditions, dimensions in mm (inch)

Selection and Ordering data	Article No.
SITRANS TS200 Temperature sensors in compact version, universal use, mineral-insulated version, for unfavorable space conditions ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7MC7212-
Sensor diameter 6 mm (0.24 inch)	6
Length of sensor element B, effective length U see dimensional drawing on page 2/114 200 mm (7.87 inch) 500 mm (19.68 inch) 750 mm (29.53 inch)	C D E
Customer-specific length of sensor element B, effective length U see dimensional drawing on page 2/114 enter customer specific length with Y44, see Order Codes below 70 ... 100 mm (2.76 ... 3.94 inch) Initial: 100 mm (3.94 inch) 101 ... 250 mm (3.98 ... 9.84 inch) Initial: 200 mm (7.87 inch) 251 ... 500 mm (9.88 ... 19.68 inch) Initial: 500 mm (19.68 inch) 501 ... 750 mm (19.72 ... 29.53 inch) Initial: 750 mm (29.53 inch) 751 ... 1 000 mm (29.57 ... 39.37 inch) Initial: 1 000 mm (39.37 inch) 1 001 ... 1 500 mm (39.4 ... 59.00 inch) Initial: 1 500 mm (59.00 inch)	B C D E F G
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration-resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-320.8 ... +1 112 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382 °F)	A B C K J
Number/Accuracy Single, basic accuracy (Class 2/Class B) 1 Single, increased accuracy (Class 1/Class A) 2 Single, highest accuracy (Class AA) 3 Double, basic accuracy (Class 2/Class B) 4 Double, increased accuracy (Class 1/Class A) 5 Double, highest accuracy (Class AA) 6	
Design of connection side Solid wire ends (sensor element) 0 Flying leads 1 LEMO coupling 1S 2 M12 connector, not for double Pt100 3 Thermocouple coupling, from TC-material (2xTC on request) 4 Mini connection head, aluminum, not for double Pt100 5	

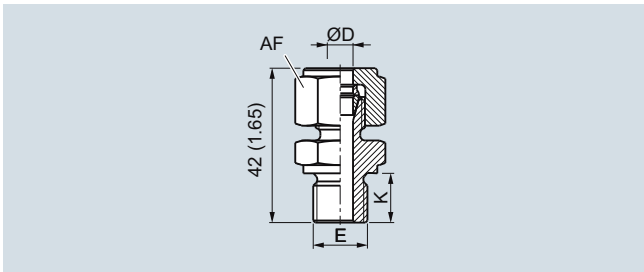
Selection and Ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order Code.	
Customer-specific length of sensor element B, effective length, U see dimensional drawing on page 2/114 Select range, enter desired length in plain text (No entry = standard length)	Y44
Additional configurations on page after next page! You find ordering examples on page 2/109.	

Temperature Measurement

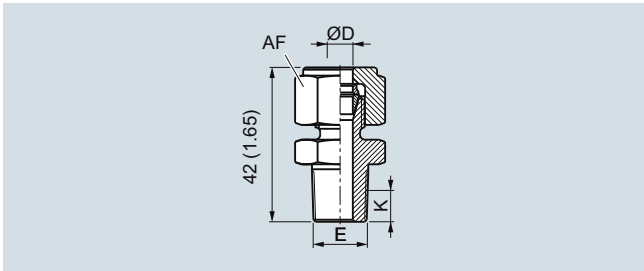
SITRANS TS200

Compact mineral-insulated

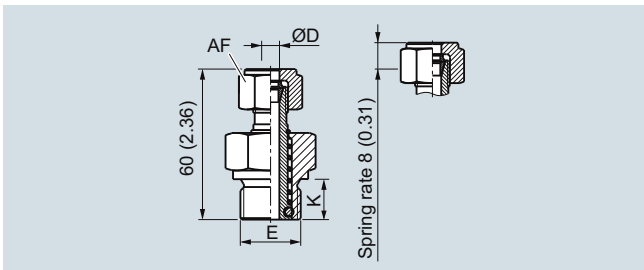
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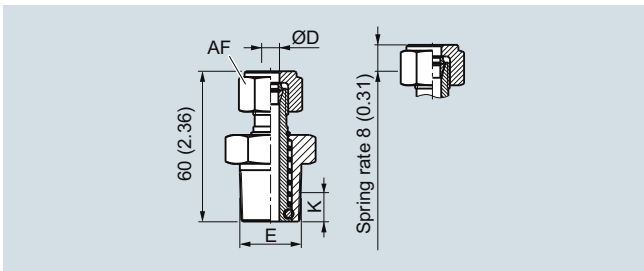
Compression fitting, dimensions in mm (inch)



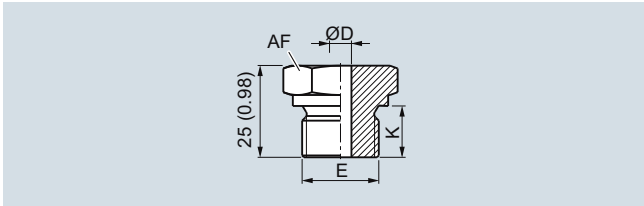
Compression fitting NPT, dimensions in mm (inch)



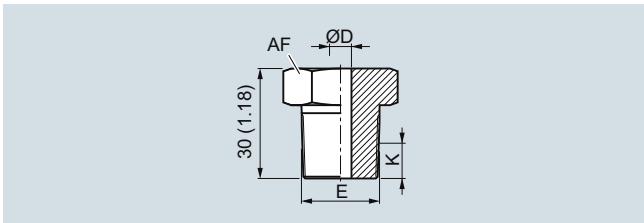
Spring-loaded compression fitting, dimensions in mm (inch)



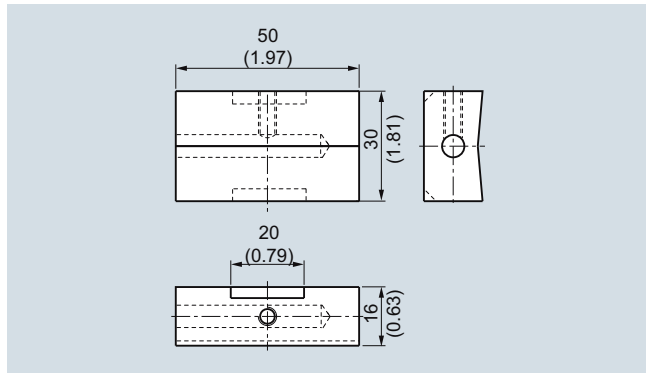
Spring-loaded compression fitting NPT, dimensions in mm (inch)



Soldering nipple, metric, dimensions in mm (inch)



Soldering nipple NPT, dimensions in mm (inch)



Surface connection piece, dimensions in mm (inch)

Selection and Ordering data	Order code
Options	
Add "-Z" to Article No., add options, separate extensions with "+" .	
Process connection	
Soldering nipple G $\frac{1}{4}$ ", enclosed	A20
Soldering nipple G $\frac{1}{2}$ ", enclosed	A21
Soldering nipple NPT $\frac{1}{2}$ ", enclosed	A22
Soldering nipple M18x1.5, enclosed	A23
Compression fitting G $\frac{1}{4}$ ", enclosed	A30
Compression fitting G $\frac{1}{2}$ ", enclosed	A31
Compression fitting NPT $\frac{1}{2}$ ", enclosed	A32
Surface connection piece, enclosed (non Ex)	A50
Explosion protection	
Intrinsic safety "ia", "ic"	E01
Certificates and approvals	
EN10204-3.1 Inspection certificate for materials coming into contact with media	C12
EN10204-3.1 Inspection certificate visual, measurement and functional inspection	C34
EN 10204-2.1: Declaration of compliance with the order	C35
ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C51
Setting, designation, calibration	
Stainless steel TAG plate , Enter lettering in plain text	Y15
Plant calibration per 1 point, enter temperature in plain text. Attention: For devices with built-in head transmitters, select test points within the set measurement range	Y33

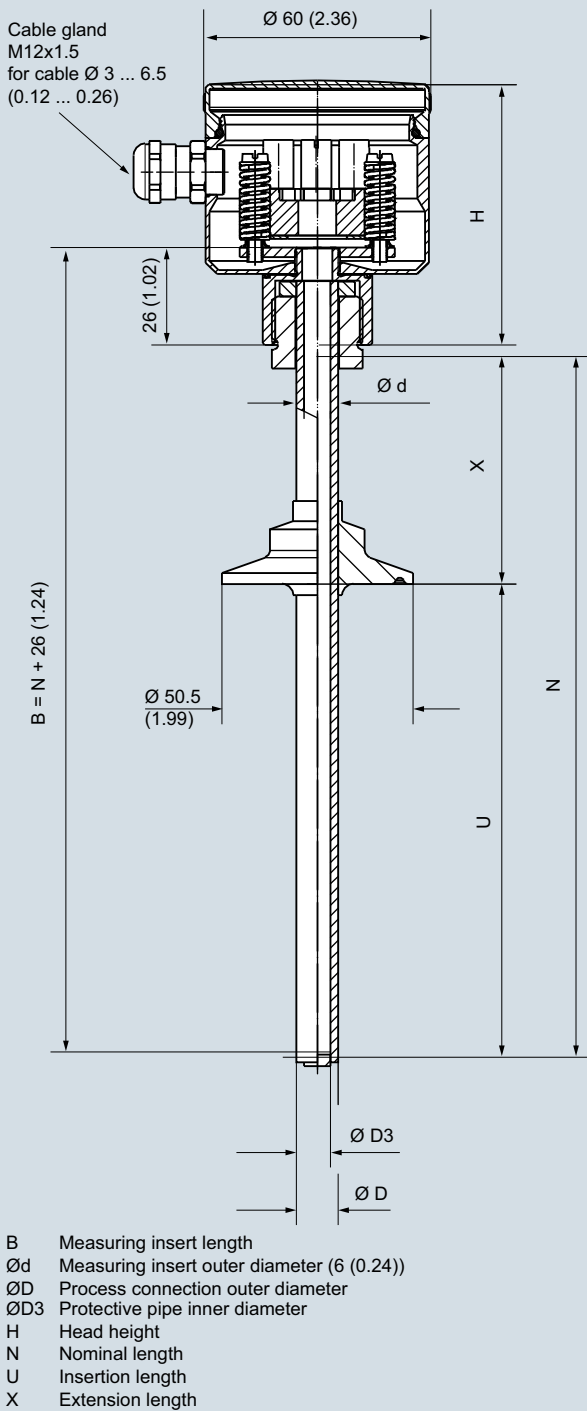
You find ordering examples on page 2/109.

Temperature Measurement

SITRANS TS300

For food, pharmaceuticals and biotechnology modular design

Dimensional drawings



SITRANS TS300 modular design

Selection and Ordering data		Article No.	Order code	Selection and Ordering data		Article No.	Order code
SITRANS TS300 for food, pharmaceuticals and biotechnology, modular design for installation in pipelines and vessels		7MC8005-	0 - 0	SITRANS TS300 for food, pharmaceuticals and biotechnology, modular design for installation in pipelines and vessels		7MC8005-	0 - 0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Neck tube length X			
Head				65 mm (2.56 inch) [M = 80 mm (3.15 inch)] 130 mm (5.12 inch) [M = 145 mm (5.71 inch)] Special version: (add Order code and plain text)		1	
Stainless steel head, BS0, screw cover (Standard version)		5		Insertion length		2	
Aluminum head, BA0, flange cover standard		1		Enter customer specific length with Y44, see Order Codes below		9	N 1 Y
Plastic cover, BM0, screw cover		2		15 mm (0.59 inch)			
Aluminum head, BB0, hinged cover low		3		16 ... 35 mm (0.63 ... 1.38 inch) Initial: 35 mm (1.38 inch)		B	
Aluminum head, BC0, hinged cover high		4		36 ... 50 mm (1.42 ... 1.97 inch) Initial: 50 mm (1.97 inch)		C	
Special version: (add Order code and plain text)		9	H 1 Y	51 ... 100 mm (2.01 ... 3.94 inch) Initial: 100 mm (3.94 inch)		D	
Process connection, material 1.4404 or 1.4435/316L				101 ... 160 mm (3.98 ... 6.30 inch) Initial: 160 mm (6.30 inch)		E	
Milk pipe union to DIN 11851 with slotted union nut and nominal diameter/pressure				161 ... 250 mm (6.34 ... 9.84 inch) Initial: 250 mm (9.84 inch)		F	
DN 25/PN 40		AA		251 ... 400 mm (9.88 ... 15.75 inch) Initial: 400 mm (15.75 inch)		G	
DN 32/PN 40		AB		1 ... 4 inch, Initial: 4 inch		H	
DN 40/PN 40		AC		4 ... 6 inch, Initial: 6 inch		J	
DN 50/PN 25		AD		6 ... 9 inch, Initial: 9 inch		K	
Clamp connection:				Special version: (add Order code and plain text)		L	
ISO 2852	DIN 32676	Tri-Clamp	Outer diameter D			Z	P 1 Y
–	–	1/2" / 3/4"	25.0 mm				
DN 25/33.7/38	DN 25/32/40	1", 1 1/2"	50.5 mm				
DN 40/51	DN 50	2"	64.0 mm				
DN 63.5	–	2 1/2"	77.5 mm				
DN 88.9	DN 80	–	106.0 mm				
Varivent connection (Tuchenhausen)				Sensor			
Ø D ₆ = 50 mm (1.97 inch), for Varivent housing DN 25 and DN 1"				Thin-film technology: measuring range -50 ... +400 °C (-58 ... +752 °F)			
Ø D ₆ = 68 mm (2.68 inch), for Varivent housing DN 40 ... 125 and 1 1/2" ... 6"				2 x Pt100, class A, three-wire 1 x Pt100, class A, four-wire			
NEUMO/BioControl				Special version: (add Order code and plain text)			
Size 25		BA		Further designs			Order code
Size 50		BB		Add "-Z" to Article No. and add Order code			
Size 65		BC		Process connection completely electropolished			P01
Ingold flange				Hygiene version (R _a < 0.8 µm (3.1 x 10 ⁻⁵ inch))			H01
DN 25 with hexagon union nut G 1 1/4", mounting length 40 mm (1.57"), diameter 24.8 mm (0.98") incl. O-ring		JA		Certificates			
Welding piece (sphere diameter 30 x 40 mm (1.2 x 1.6 inch) long)		LA		<ul style="list-style-type: none"> Roughness depth measurement R_a certified by factory certificate to EN 10204-3.1 Material certificate to EN 10204-3.1 			C18
Special version: Type of screwed gland and nominal diameter (add Order code and plain text)		ZA	J 1 Y	TAG plate made of stainless steel specify TAG No. in plain text			C12
Protective tube				Test report (at 0, 50 and 100%) specify measuring range in plain text			Y15
Ø D = 6 mm (0.24 inch)				If optional head transmitters are integrated, please note that all calibration points are located in the set measuring range. If the points are located outside the standard measuring range, a Y01 addition is always required.			Y33
Ø D = 9 mm (0.35 inch)				Insertion length customer-specific			Y44
Ø D = 9 mm (0.35 inch)				Select range, enter desired length in plain text (No entry = standard length)			
Ø D = 9 mm (0.35 inch) tapered tip							
D ₂ = 5 Ø x 20 mm (0.2 x 0.79 inch)							
Special version: (add Order code and plain text)		9	L 1 Y				

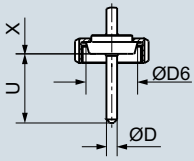
Temperature Measurement

SITRANS TS300

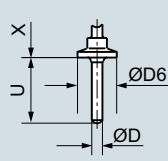
For food, pharmaceuticals and biotechnology modular design

Dimensional drawings

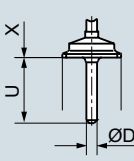
Conical connection with union nut according acc. to DIN 11851



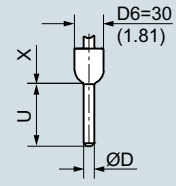
Tri-Clamp-connection



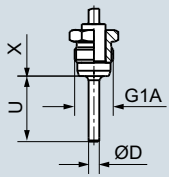
Clamp-connection acc. to DIN 32676 or ISO 2852



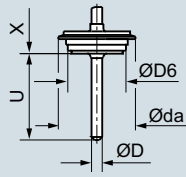
Ball weld sleeve Ball 30 x 40 (1.18 x 1.58)



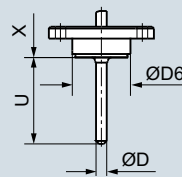
G1A without dead space due to conical metal cone



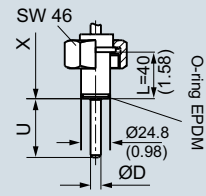
Varivent connection



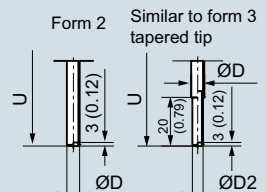
NEUMO BioControl



Ingold connection DN 25 with union nut



Protective pipe design based on DIN 43772



Process connections, dimensions in mm (inch)

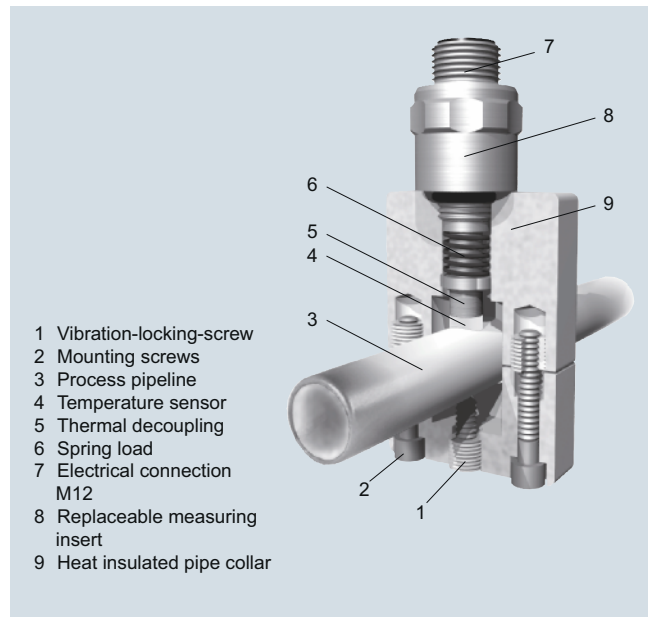
Selection and Ordering data	Order code
Further designs	
Add "-Z" to Article No. and specify Order Code.	
Built-in head transmitter	
Measuring range to be set must be specified with plain text data "Y11".	
SITRANS TH100, 4 ... 20 mA, Pt100	T10
SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100	T11
SITRANS TH200, 4 ... 20 mA, universal	T20
SITRANS TH200 Ex i(ATEX), 4 ... 20 mA, universal	T21
SITRANS TH300, HART, universal	T30
SITRANS TH300 Ex i (ATEX), HART, universal	T31
SITRANS TH400 PA, universal	T40
SITRANS TH400 PA Ex i, universal	T41
SITRANS TH400 FF, universal	T45
SITRANS TH400 FF Ex i, universal	T46
Transmitter options	
Transmitter, enter complete setting in plain text (Y11:+/-NNNN ... +/-NNNN C,F)	Y11
Enter measuring point (max. 8 characters) in plain text	Y17
Transmitter, enter measuring point description (max. 16 characters) in plain text	Y23
Transmitter, enter measuring point text (max. 32 characters) in plain text	Y24
Transmitter, enter bus address in plain text	Y25
Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA)	U36
Transmitter with a SIL 2 conformity	C20
Transmitter with a SIL 2/3 conformity	C23
Transmitter test protocol (5 points)	C11
Further options	
Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs)	G01
M12 plug (in combination with 1x Pt100 and/or transmitter, Non-Ex)	G12
Option not found?	
Specify special version in plain text	Y98
Process number for the special version	Y99

Temperature Measurement

SITRANS TS300

For food, pharmaceuticals and biotechnology clamp-on design

Dimensional drawings



Resistance thermometer with protection pipe in Clamp-on design,
 dimensions in mm (inch)

For food, pharmaceuticals and biotechnology clamp-on design

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS TS300		7MC8016-	0	SITRANS TS300		7MC8016-	0
for food, pharmaceuticals and biotechnology Clamp-on design for the measuring of the pipe surface temperature				for food, pharmaceuticals and biotechnology Clamp-on design for the measuring of the pipe surface temperature			
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				38.1 (1.50)			A3
Design				41.0 (1.61)			B3
Acc. to IEC 60751, class A [-40 ... +150 °C (-40 ... +302 °F)]		1		42.4 (1.67)			C3
Process optimized for steam sterilization [100 ... 150 °C (212 ... 302 °F)]		0		44.5 (1.75)			D3
Type of connection				48.3 (1.90)	90 x 85 x 20		E3
Round connector M12 x 1				50.8 (2.00)	(3.54 x 3.35 x 0.79)		F3
connection head form B, stainless steel				53.0 (2.09)			G3
4 ... 20 mA compact transmitter				54.0 (2.13)			H3
SITRANS TH100slim (standard measuring range 0 ... 100 °C (32 ... 212 °F))				57.0 (2.24)			J3
Mounting with pipe collar				Special size ¹⁾			Z0 K1 Y
Pipe outer-Ø mm (inch)	Collar size mm (inch)						
4 (0.16)							
6 (0.24)							
6.35 (0.25)							
8 (0.31)							
9.35 (0.37)							
10 (0.39)							
10.2 (0.40)	50 x 35 x 20						
10.3 (0.41)	(1.97 x 1.38 x 0.79)						
12 (0.47)							
12.7 (0.50)							
13 (0.51)							
13.5 (0.53)							
13.7 (0.54)							
14 (0.55)							
15.88 (0.62)							
16 (0.63)							
17.2 (0.68)							
18.0 (0.71)							
19.0 (0.74)							
19.05 (0.75)							
20.0 (0.79)							
21.3 (0.84)							
22.0 (0.87)							
23.0 (0.90)							
24.0 (0.94)							
25.0 (0.98)							
25.4 (1.00)							
26.7 (1.05)	70 x 70 x 20						
26.9 (1.06)	(2.76 x 2.76 x 0.79)						
28.0 (1.10)							
29.0 (1.14)							
30.0 (1.18)							
31.8 (1.25)							
32.0 (1.26)							
33.4 (1.31)							
33.7 (1.33)							
34.0 (1.34)							
35.0 (1.38)							
36.0 (1.42)							
38.0 (1.49)							

¹⁾ Special sizes for pipe outer diameters: In order to process "Z0" special sizes, the following two additional items of information are essential:
 - the required diameter specified in plain text under "K1Y"
 - Selection of the corresponding pipe collar, clamping band or clamping bracket size (Order codes "S11" to "S35")

Recommended for all versions: Heat-conductive-compound, silicone-free, syringe 3 g, Order Code: L15 (see page 2/125)

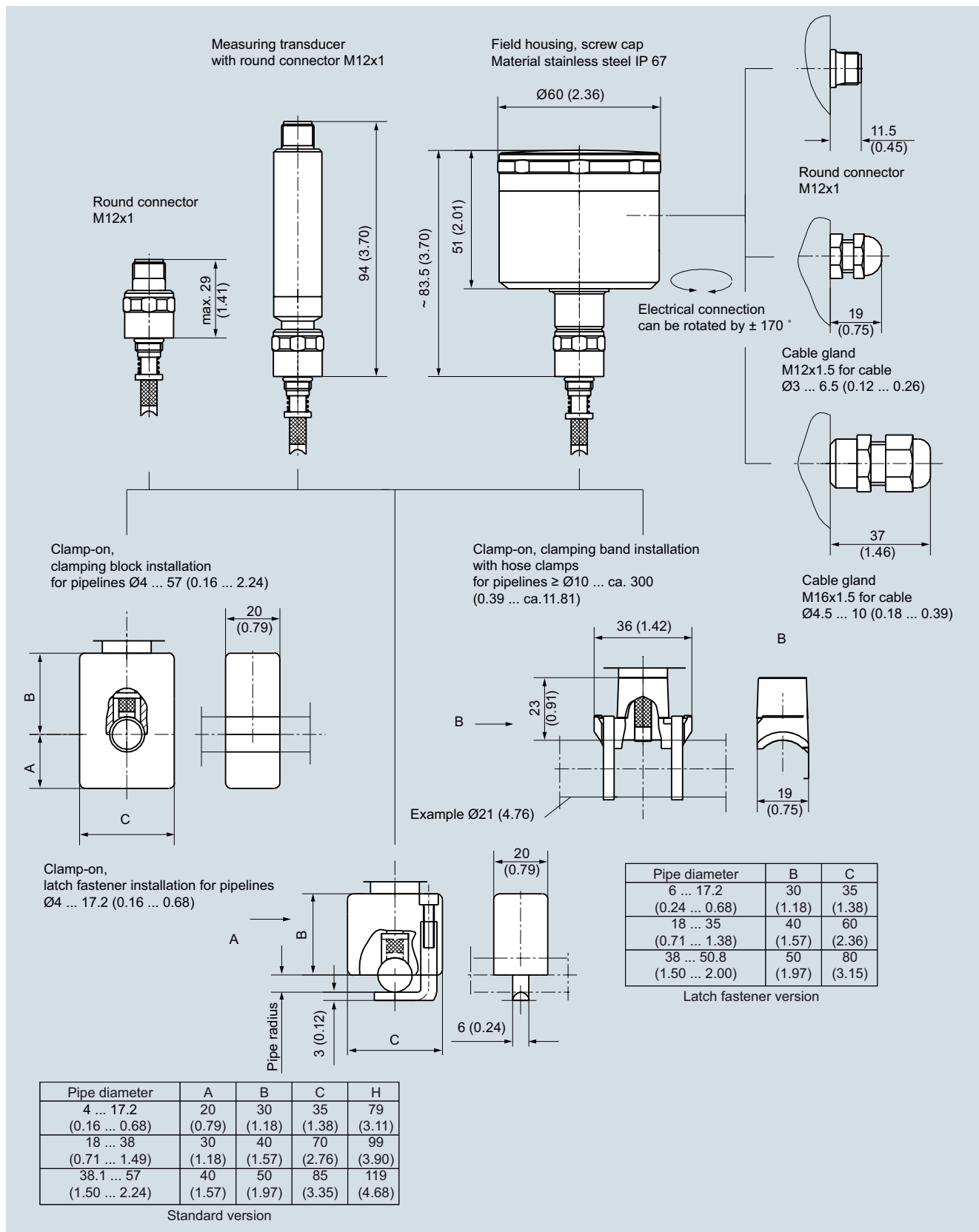
Temperature Measurement

SITRANS TS300

For food, pharmaceuticals and biotechnology clamp-on design

Dimensional drawings

2



SITRANS TS300 Clamp-on design, round connector, field housing, cable gland, variants, dimensions in mm (inch)

For food, pharmaceuticals and biotechnology clamp-on design

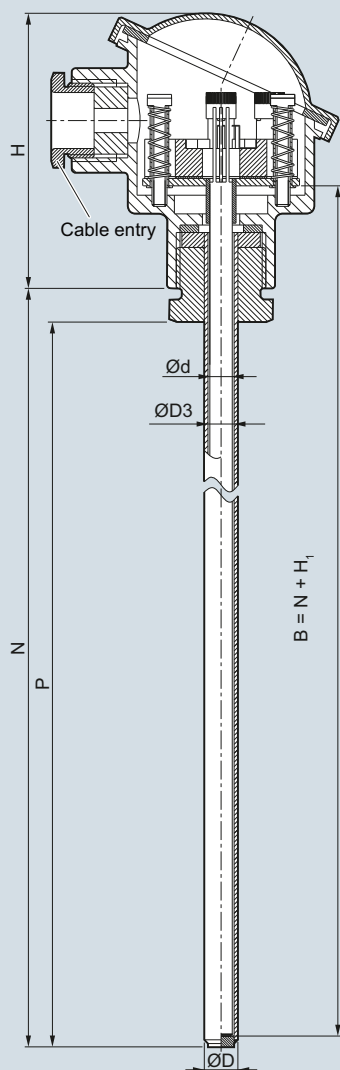
Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Further Options	
Add "-Z" to Article No. and specify Order Code.		Assignment marking, engraving instead of adhesive label (Serial number and pipe diameter on plug and plastic block)	
Built in head transmitter		2 mm drain hole	
Measuring range to be set must be specified with plain text data "Y11".		Sensor 4-wire connection	
SITRANS TH100, 4 ... 20 mA, Pt100	T10	Heat-conductive-compound, silicone-free, syringe 3 g	
SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100	T11	Suffixes	
SITRANS TH200, 4 ... 20 mA, universal	T20	Add "-Z" to Article No. and specify Order code and plain text.	
SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, universal	T21	TAG plate made of stainless steel (specify TAG No. in plain text)	
SITRANS TH300, HART, universal	T30	Test report at 50 % and 100 % (specify the measuring range in plain text)	
SITRANS TH300 Ex i (ATEX), HART, universal	T31	If optional head transmitters are integrated, please note that all calibration points are located in the set measuring range. If the points are located outside the standard measuring range, a Y01 addition is always required.	
SITRANS TH400 PA, universal	T40	Special version, specify in plain text	
SITRANS TH400 PA Ex i, universal	T41	Process number for special version	
SITRANS TH400 FF, universal	T45		
SITRANS TH400 FF Ex i, universal	T46		
Transmitter options			
Transmitter, enter complete setting in plain text (Y11:+/-NNNN ... +/-NNNN C,F)	Y11		
Enter measuring point (max. 8 characters) in plain text	Y17		
Transmitter, enter measuring point description (max. 16 characters) in plain text	Y23		
Transmitter, enter measuring point text (max. 32 characters) in plain text	Y24		
Transmitter, enter bus address in plain text	Y25		
Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA)	U36		
Transmitter with a SIL 2 conformity	C20		
Transmitter with a SIL 2/3 conformity	C23		
Transmitter test protocol (5 points)	C11		
Other cable gland (only for connection head)			
Polyamide for cable diameter 4.5 ... 10 mm (0.18 ... 0.39 inch)	K02		
Stainless steel for cable diameter 3 ... 6.5 mm (0.12 ... 0.25 inch)	K03		
Round connector M12 x 1	K11		
Deviating pipe; mm (inch)	Collar size; mm (inch)		
4 ... 17.2 (0.16 ... 0.68)	50 x 35 (1.97 x 1.38)	S11	
18 ... 38 (0.71 ... 1.49)	70 x 70 (2.76 x 2.76)	S12	
38.1 ... 57 (1.5 ... 2.24)	90 x 85 (3.54 x 3.35)	S13	
Larger nominal diameters on request		S19	
Space-saving mounting (latch fastening)			
Outer pipe; mm (inch):			
4 ... 17.2 (0.16 ... 0.68)		S21	
18 ... 35 (0.71 ... 1.38)		S22	
(Clamping band version recommended, see below)			
38 ... 50.8 (1.45 ... 2.00)		S23	
(Clamping band version recommended, see below)			
Clamping band fastening (specify external tube diameter same as for standard collar)			
Outer pipe; mm (inch):			
10 ... 57 (0.39 ... 2.24)		S31	
58 ... 220 (2.28 ... 8.66)		S32	
Without clamping band		S35	

Temperature Measurement

SITRANS TS500

Type 2, tubular version without process connection

Dimensional drawings



B	Measuring insert length
Ød	Measuring insert outer diameter (6 (0.24))
ØD	Process connection outer diameter
ØD3	Thermowell internal diameter
H	Head height
H ₁	Typ Axx > 41 (1.61) Typ Bxx > 26 (1.02)
N	Nominal length
P	Space for process connection P ~ N - 9 (0.35)

SITRANS TS500, temperature sensors for vessels and pipings, tubular version for minimal to medium stress, without process connection, without extension, plug-in or use with moveable compression fittings, dimensions in mm (inch)

Type 2, tubular version without process connection

Selection and Ordering data	Article No.
SITRANS TS500 Pipe version for minimal to medium stress, as per thermowell DIN 43722, Type 2, without process connection, without extension, plug-in or use with moveable compression fittings	7MC751-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Material, in contact with media 316Ti (1.4571) 316L (1.4404 or 1.4435)	1 2
Process connection Without process connection (for compression fitting) N=U	0 N
Thermowell form 2; 9 mm (0.35 inch) 2; 12 mm (0.47 inch)	A B
Insertion length U (=N), Standard 160 mm (6.3 inch) 250 mm (9.84 inch) 400 mm (15.75 inch)	0 4 1 2 2 2
Insertion length U (=N), customer-specific enter customer specific length with Y44, see Order Codes on page 2/129 80 ... 100 mm (3.15 ... 3.94 inch) Initial: 100 mm (3.94 inch) 101 ... 120 mm (3.98 ... 4.72 inch) Initial: 120 mm (4.72 inch) 121 ... 140 mm (4.76 ... 5.51 inch) Initial: 140 mm (5.51 inch) 141 ... 160 mm (5.55 ... 6.30 inch) Initial: 160 mm (6.30 inch) 161 ... 180 (6.34 ... 7.09 inch) Initial: 180 mm (7.09) 181 ... 200 (7.13 ... 7.87 inch) Initial: 200 mm (7.87 inch) 201 ... 220 (7.91 ... 8.66 inch) Initial: 220 mm (8.66 inch) 221 ... 240 (8.7 ... 9.45 inch) Initial: 225 mm (8.86 inch) 241 ... 260 (9.48 ... 10.24 inch) Initial: 250 mm (9.84 inch) 261 ... 280 (10.28 ... 11.02 inch) Initial: 280 mm (11.02 inch) 281 ... 300 (11.02 ... 11.81 inch) Initial: 285 mm (11.22 inch) 301 ... 320 (11.85 ... 12.6 inch) Initial: 315 mm (12.4 inch) 321 ... 340 (12.64 ... 13.39 inch) Initial: 340 mm (13.39 inch) 341 ... 360 (13.43 ... 14.17 inch) Initial: 360 mm (14.17 inch) 361 ... 380 (14.21 ... 14.96 inch) Initial: 380 mm (14.96 inch) 381 ... 400 (15 ... 15.75 inch) Initial: 400 mm (15.75 inch) 401 ... 420 (15.79 ... 16.54 inch) Initial: 420 mm (16.54 inch) 421 ... 440 (16.57 ... 17.32 inch) Initial: 440 mm (17.32 inch) 441 ... 460 (17.36 ... 18.11 inch) Initial: 460 mm (18.11 inch) 461 ... 480 (18.15 ... 18.90 inch) Initial: 465 mm (18.30 inch) 481 ... 500 (18.94 ... 19.68 inch) Initial: 500 mm (19.68 inch) 501 ... 550 (19.72 ... 21.65 inch) Initial: 510 mm (20.08 inch) 551 ... 600 (21.69 ... 23.62 inch) Initial: 600 mm (23.62 inch) 601 ... 650 (23.66 ... 25.59 inch) Initial: 650 mm (25.59 inch)	0 1 0 2 0 3 0 4 0 5 0 6 0 7 1 1 1 2 1 3 1 4 1 5 1 6 2 0 2 1 2 2 2 3 2 4 2 5 2 6 2 7 3 1 3 2 3 3

Selection and Ordering data	Article No.
SITRANS TS500 Pipe version for minimal to medium stress, as per thermowell DIN 43722, Type 2, without process connection, without extension, plug-in or use with moveable compression fittings	7MC751-
651 ... 700 (25.63 ... 27.56 inch) Initial: 700 mm (27.56 inch)	3 4
701 ... 750 (27.6 ... 29.53 inch) Initial: 750 mm (29.53 inch)	3 5
751 ... 800 (29.57 ... 31.50 inch) Initial: 800 mm (31.50 inch)	3 6
801 ... 850 (31.5 ... 33.47 inch) Initial: 850 mm (33.47 inch)	3 7
851 ... 900 (33.5 ... 35.43 inch) Initial: 900 mm (35.43 inch)	4 1
901 ... 950 (35.47 ... 37.4 inch) Initial: 950 (37.4 inch)	4 2
951 ... 1 000 (37.44 ... 39.37 inch) Initial: 1 000 mm (39.37 inch)	4 3
1001 ... 1 100 (39.4 ... (43.30 inch) Initial: 1 100 (43.30 inch)	4 4
1 101 ... 1 200 (43.35 ... 47.24 inch) Initial: 1 200 mm (47.24 inch)	4 5
1 201 ... 1 300 (47.28 ... 51.18 inch) Initial: 1 300 mm (51.18 inch)	4 6
1 301 ... 1 400 (51.22 ... 55.11 inch) Initial: 1400 mm (55.11 inch)	4 7
1 401 ... 1 500 (55.15 ... 59.05 inch) Initial: 1 500 mm (59.05 inch)	5 1
Extension X Standard length for Type 2 as per DIN 43722 (without extension N=U)	0

Additional configurations on page after next page!

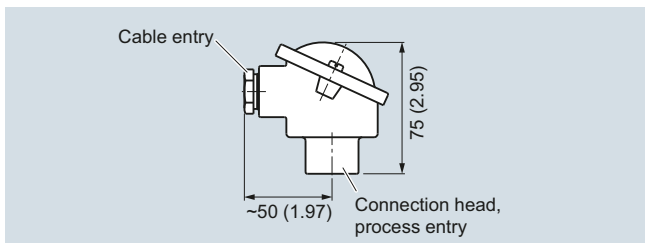
You find ordering examples on page 2/109!

Temperature Measurement

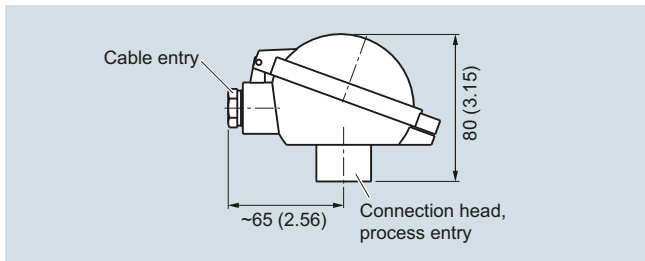
SITRANS TS500

Type 2, tubular version without process connection

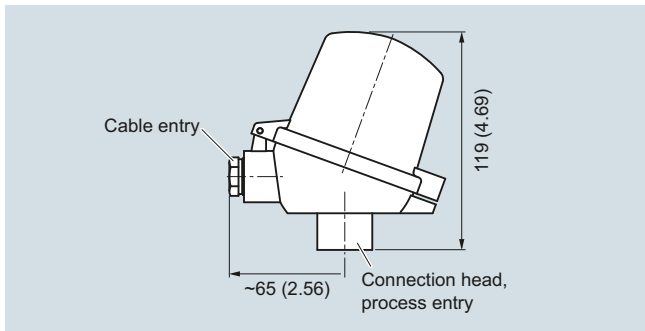
2



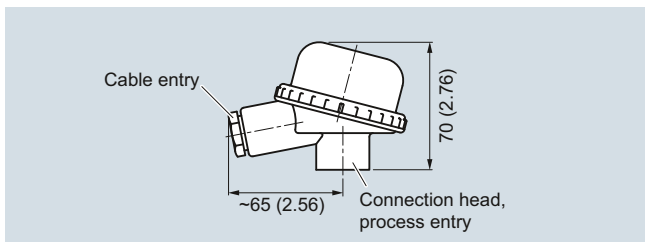
Connection head, aluminum, Type BA0, dimensions in mm (inch)



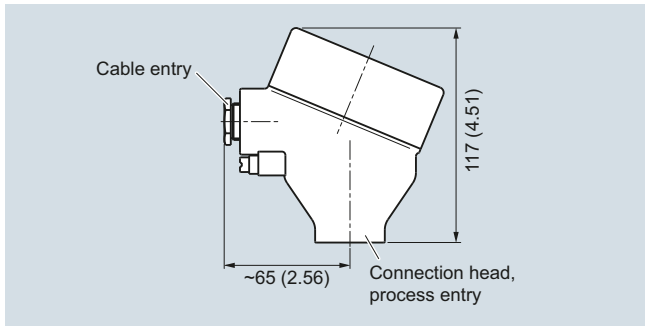
Connection head, aluminum, Type BB0, dimensions in mm (inch)



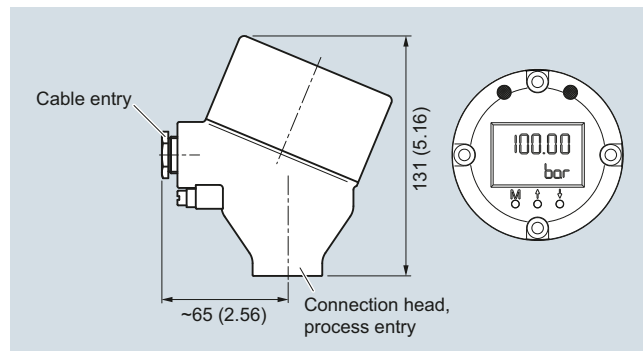
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



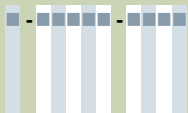
Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS TS500 Tubular version for minimal to medium stress, as per thermowell DIN 43722, Type 2, without process connection, without extension, plug-in or use with moveable compression fittings	7MC751- 	Options Add "-Z" to Article No. and add options, separate extensions with "+".	
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0, high hinged cover, screw connection Stainless steel head, AU0, screw cover, suitable for Ex d Stainless steel head, AV0, screw cover, suitable for Ex d, display	A B C G H M P U V	Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration-resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1 112 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type J, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)	A B C K J N	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)	1 2 3 5 6 7	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Selection and Ordering data	Order code	Designation, calibration Stainless steel TAG plate, enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Further designs Add "-Z" to Article No. and specify Order Code.		Transmitter options Transmitter, enter complete setting in plain text (Y01:+/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44	Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter, Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with 1/2" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0 Compression fitting G1/2", enclosed Compression fitting NPT1/2", enclosed	G01 G12 G13 G20 A02 A03 A31 A32

You find ordering examples on page 2/109!

Temperature Measurement

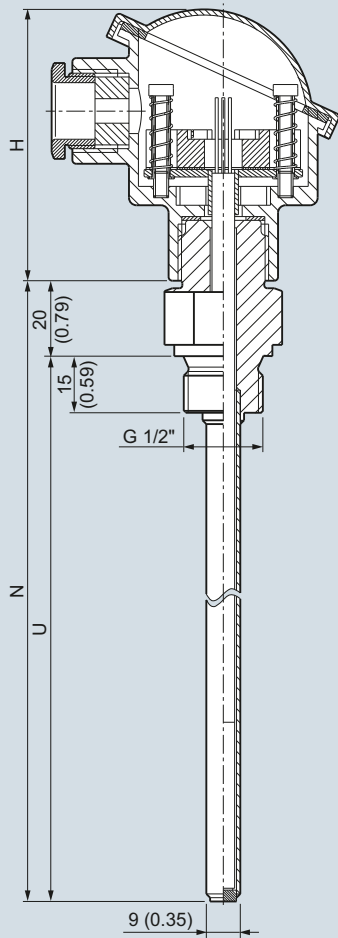
SITRANS TS500

Type 2N, tubular version with screw socket

Dimensional drawings

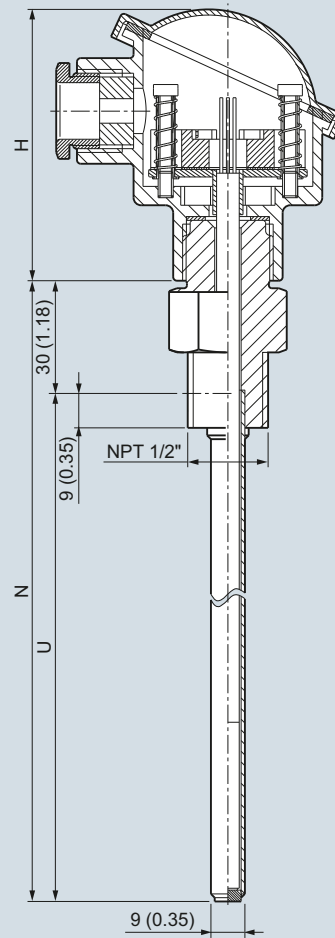
SITRANS TS500, temperature sensors for vessels and pipelines, tubular version for minimal to medium stress, thermowell Type 2N similar to DIN 43722, screwed in, without extension, non-alignable connection head.

2



H Head height
N Nominal length
U Insertion length

Connection type "G", dimensions in mm (inch)



H Head height
N Nominal length
U Insertion length

Connection type "NPT", dimensions in mm (inch)

Selection and Ordering data	Article No.
SITRANS TS500 Tubular thermowell, minimal to medium stress, Type 2N similar to DIN 43722, screwed in, without extension, for maximum process temperatures of 100 °C	7MC751-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Material, in contact with media	
316Ti (1.4571)	1
316L (1.4404 or 1.4435)	2
Process connection	
G ½" (½" BSPF)	1 C
½" NPT	1 J
Thermowell form	
2N, 9 mm (0.35 inch)	A
Standard insertion length	
100 mm (3.97 inch)	0 1
160 mm (6.30 inch)	0 4
230 mm (9.06 inch)	1 0
360 mm (14.17 inch)	2 0
510 mm (20.08 inch)	3 1
Customer-specific insertion length enter customer specific length with Y44, see page 2/133 Order Codes	
80 ... 100 mm (3.15 ... 3.94 inch) Initial: 100 mm (3.94 inch)	0 1
101 ... 120 mm (3.98 ... 4.72 inch) Initial: 120 mm (4.72 inch)	0 2
121 ... 140 mm (4.76 ... 5.51 inch) Initial: 140 mm (5.51 inch)	0 3
141 ... 160 mm (5.55 ... 6.30 inch) Initial: 160 mm (6.30 inch)	0 4
161 ... 180 mm (6.34 ... 7.09 inch) Initial: 180 mm (7.09 inch)	0 5
181 ... 200 mm (7.13 ... 7.87 inch) Initial: 200 mm (7.87 inch)	0 6
201 ... 220 mm (7.91 ... 8.66 inch) Initial: 220 mm (8.66 inch)	0 7
221 ... 240 mm (8.70 ... 9.45 inch) Initial: 230 mm (9.06 inch)	1 0
241 ... 260 mm (9.49 ... 10.24 inch) Initial: 250 mm (9.84 inch)	1 2
261 ... 280 mm (10.28 ... 11.02 inch) Initial: 280 mm (11.02 inch)	1 3
281 ... 300 mm (11.06 ... 11.81 inch) Initial: 285 mm (11.22 inch)	1 4
301 ... 320 mm (11.85 ... 13.00 inch) Initial: 315 mm (12.40 inch)	1 5
321 ... 340 mm (12.64 ... 13.39 inch) Initial: 340 mm (13.39 inch)	1 6
341 ... 360 mm (13.43 ... 14.17 inch) Initial: 360 mm (14.17 inch)	2 0
361 ... 380 mm (14.21 ... 14.96 inch) Initial: 380 mm (14.96 inch)	2 1
381 ... 400 mm (14.99 ... 15.75 inch) Initial: 400 mm (15.75 inch)	2 2
401 ... 420 mm (15.79 ... 16.54 inch) Initial: 420 mm (16.54 inch)	2 3
421 ... 440 mm (16.57 ... 17.32 inch) Initial: 440 mm (17.32 inch)	2 4
441 ... 460 mm (17.36 ... 18.11 inch) Initial: 460 mm (18.11 inch)	2 5
461 ... 480 mm (18.15 ... 18.90 inch) Initial: 465 mm (18.30 inch)	2 6
481 ... 500 mm (18.94 ... 19.69 inch) Initial: 500 mm (19.69 inch)	2 7

Selection and Ordering data	Article No.
SITRANS TS500 Tubular thermowell, minimal to medium stress, Type 2N similar to DIN 43722, screwed in, without extension, for maximum process temperatures of 100 °C	7MC751-
501 ... 550 mm (19.72 ... 21.65 inch) Initial: 510 mm (20.08 inch)	3 1
551 ... 600 mm (21.69 ... 23.62 inch) Initial: 600 mm (23.62 inch)	3 2
601 ... 650 mm (23.66 ... 25.59 inch) Initial: 650 mm (25.59 inch)	3 3
651 ... 700 mm (25.63 ... 27.56 inch) Initial: 700 mm (27.56 inch)	3 4
701 ... 750 mm (27.60 ... 29.53 inch) Initial: 750 mm (29.53 inch)	3 5
751 ... 800 mm (29.57 ... 31.50 inch) Initial: 800 mm (31.50 inch)	3 6
801 ... 850 mm (31.54 ... 33.46 inch) Initial: 850 mm (33.46 inch)	3 7
851 ... 900 mm (33.50 ... 35.43 inch) Initial: 900 mm (35.43 inch)	4 1
901 ... 950 mm (35.47 ... 37.40 inch) Initial: 950 mm (37.40 inch)	4 2
951 ... 1 000 mm (37.44 ... 39.37 inch) Initial: 1 000 mm (39.37 inch)	4 3
1 001 ... 1 100 mm (39.41 ... 43.31 inch) Initial: 1 100 mm (43.31 inch)	4 4
1 101 ... 1 200 mm (43.35 ... 47.24 inch) Initial: 1 200 mm (47.24 inch)	4 5
1 201 ... 1 300 mm (47.28 ... 51.18 inch) Initial: 1 300 mm (51.18 inch)	4 6
1 301 ... 1 400 mm (51.22 ... 55.12 inch) Initial: 1400 mm (55.12 inch)	4 7
1 401 ... 1 500 mm (55.16 ... 59.05 inch) Initial: 1 500 mm (59.05 inch)	5 1
Extension X without neck tube, (not adjustable)	0

Additional configurations on page after next page!

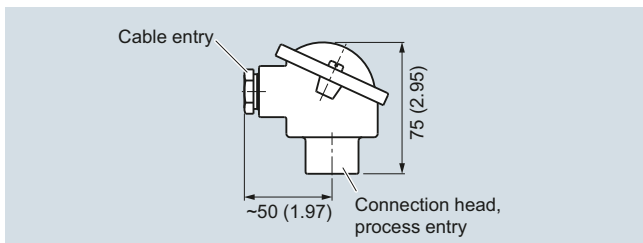
You find ordering examples on page 2/109!

Temperature Measurement

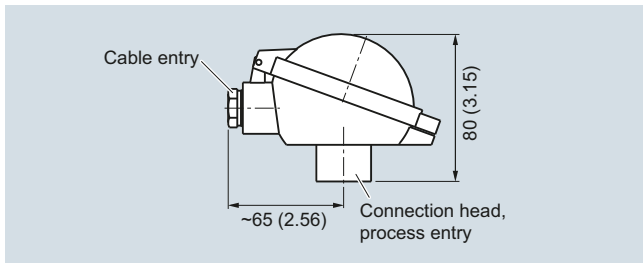
SITRANS TS500

Type 2N, tubular version with screw socket

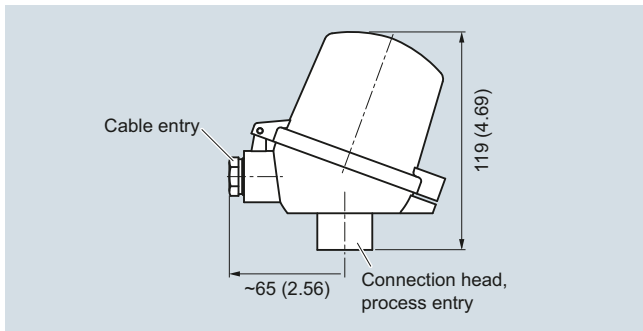
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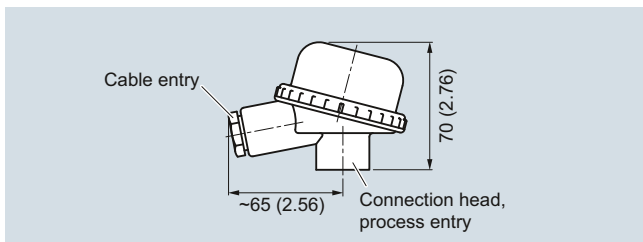
Connection head, aluminum, Type BA0, dimensions in mm (inch)



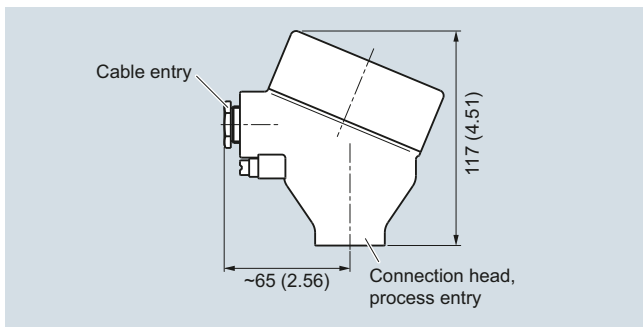
Connection head, aluminum, Type BB0, dimensions in mm (inch)



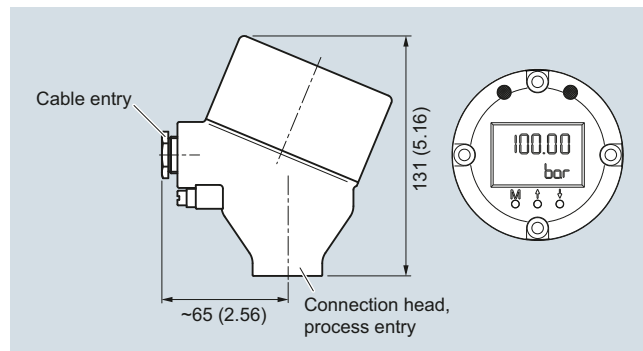
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS TS500 Tubular thermowell, minimal to medium stress, Type 2N similar to DIN 43722, screwed in, without extension, for maximum process temperatures of 100 °C	7MC751-	Options Add "-Z" to Article No. and add options, separate extensions with "+" .	
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0, high hinged cover, screw connection Stainless steel head, AU0, screw cover, suitable for Ex d Stainless steel head, AV0, screw cover, suitable for Ex d, display	A B C G H M P U V	Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration-resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1 112 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type J, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)	A B C K J N	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)	1 2 3 5 6 7	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Selection and Ordering data	Order code	Designation, calibration Stainless steel TAG plate, enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Further designs Add "-Z" to Article No. and specify Order Code.		Transmitter options Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44	Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter, Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with 1/2" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G01 G12 G13 G20 A02 A03

You find ordering examples on page 2/109!

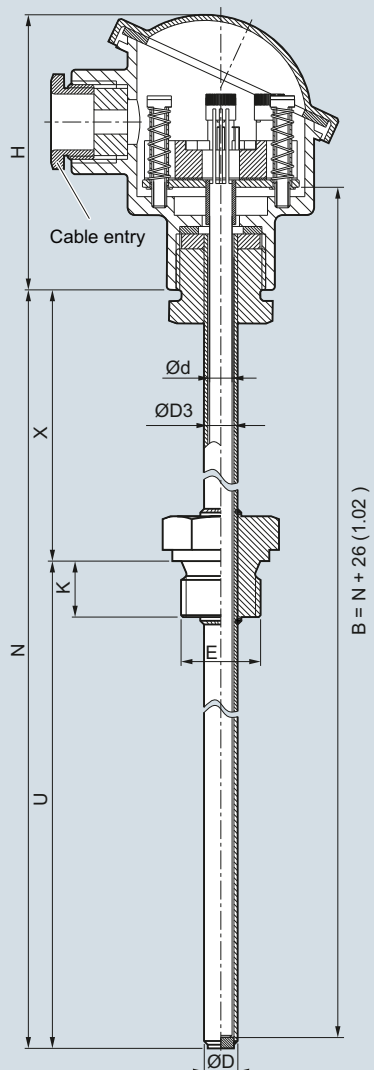
Temperature Measurement

SITRANS TS500

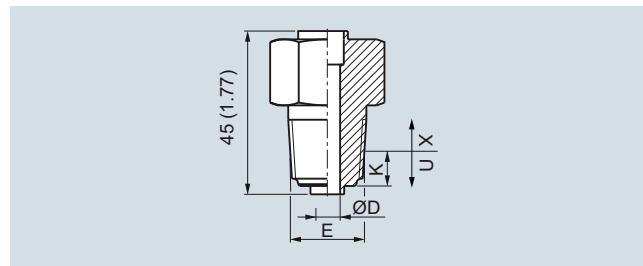
Type 2G, tubular version with screw socket and extension

Dimensional drawings

2



- B Measuring insert length
- Ød Measuring insert outer, diameter (6 (0.24))
- ØD Process connection, outer diameter
- ØD3 Thermowell internal diameter
- E Process connection, thread size
- H Head height
- K Screw depth
- N Nominal length
- U Insertion length
- X Extension length



Tapered process connection, dimensions in mm (inch)

SITRANS TS500, temperature sensors for vessels and pipelines, tubular version for minimal to minimum to medium stress, thermowell as per DIN 43722, Type 2G, screwed in, with extension, dimensions in mm (inch)

Type 2G, tubular version with screw socket and extension

Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500	7MC751-		SITRANS TS500	7MC751-	
Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 2G, screwed in, with extension			Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 2G, screwed in, with extension		
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Material, in contact with media					
316Ti (1.4571)	1				
316L (1.4404 or 1.4435)	2				
Process connection					
Cylindrical: G½" (½" BSPF)	1 C				
Cylindrical: G1" (1" BSPF)	1 E				
Tapered: NPT½"	1 J				
Thermowell form					
2G, 9 mm (0.35 inch)	A				
2G, 12 mm (0.47 inch)	B				
Insertion length U standard					
160 mm (6.30 inch)		0 4			
250 mm (9.84 inch)		1 2			
400 mm (15.75 inch)		2 2			
Insertion length U customer-specific					
enter customer specific length with Y44, see page 2/137 Order Codes					
80 ... 100 mm (3.15 ... 3.94 inch)		0 1			
Initial: 100 mm (3.94 inch)					
101 ... 120 mm (3.98 ... 4.72 inch)		0 2			
Initial: 120 mm (4.72 inch)					
121 ... 140 mm (4.76 ... 5.51 inch)		0 3			
Initial: 140 mm (5.51 inch)					
141 ... 160 mm (5.55 ... 6.30 inch)		0 4			
Initial: 160 mm (6.30 inch)					
161 ... 180 mm (6.34 ... 7.09 inch)		0 5			
Initial: 180 mm (7.09 inch)					
181 ... 200 mm (7.13 ... 7.87 inch)		0 6			
Initial: 200 mm (7.87 inch)					
201 ... 220 mm (7.91 ... 8.66 inch)		0 7			
Initial: 220 mm (8.66 inch)					
221 ... 240 mm (8.70 ... 9.45 inch)		1 1			
Initial: 225 mm (8.86 inch)					
241 ... 260 mm (9.49 ... 10.24 inch)		1 2			
Initial: 250 mm (9.84 inch)					
261 ... 280 mm (10.28 ... 11.02 inch)		1 3			
Initial: 280 mm (11.02 inch)					
281 ... 300 mm (11.06 ... 11.81 inch)		1 4			
Initial: 285 mm 11.22 inch)					
301 ... 320 mm (11.85 ... 13.00 inch)		1 5			
Initial: 315 mm (12.40 inch)					
321 ... 340 mm (12.64 ... 13.39 inch)		1 6			
Initial: 340 mm (13.39 inch)					
341 ... 360 mm (13.43 ... 14.17 inch)		2 0			
Initial: 360 mm (14.17 inch)					
361 ... 380 mm (14.21 ... 14.96 inch)		2 1			
Initial: 380 mm (14.96 inch)					
381 ... 400 mm (14.99 ... 15.75 inch)		2 2			
Initial: 400 mm (15.75 inch)					
401 ... 420 mm (15.79 ... 16.54 inch)		2 3			
Initial: 420 mm (16.54 inch)					
421 ... 440 mm (16.57 ... 17.32 inch)		2 4			
Initial: 440 mm (17.32 inch)					
441 ... 460 mm (17.36 ... 18.11 inch)		2 5			
Initial: 460 mm (18.11 inch)					
461 ... 480 mm (18.15 ... 18.90 inch)		2 6			
Initial: 465 mm (18.30 inch)					
481 ... 500 mm (18.94 ... 19.69 inch)		2 7			
Initial: 500 mm (19.69 inch)					
			501 ... 550 mm (19.72 ... 21.65 inch)		3 1
			Initial: 510 mm (20.08 inch)		
			551 ... 600 mm (21.69 ... 23.62 inch)		3 2
			Initial: 600 mm (23.62 inch)		
			601 ... 650 mm (23.66 ... 25.59 inch)		3 3
			Initial: 650 mm (25.59 inch)		
			651 ... 700 mm (25.63 ... 27.56 inch)		3 4
			Initial: 700 mm (27.56 inch)		
			701 ... 750 mm (27.60 ... 29.53 inch)		3 5
			Initial: 750 mm (29.53 inch)		
			751 ... 800 mm (29.57 ... 31.50 inch)		3 6
			Initial: 800 mm (31.50 inch)		
			801 ... 850 mm (31.54 ... 33.46 inch)		3 7
			Initial: 850 mm (33.46 inch)		
			851 ... 900 mm (33.50 ... 35.43 inch)		4 1
			Initial: 900 mm (35.43 inch)		
			901 ... 950 mm (35.47 ... 37.40 inch)		4 2
			Initial: 950 mm (37.40 inch)		
			951 ... 1 000 mm (37.44 ... 39.37 inch)		4 3
			Initial: 1 000 mm (39.37 inch)		
			1 001 ... 1 100 mm (39.41 ... 43.31 inch)		4 4
			Initial: 1 100 mm (43.31 inch)		
			1 101 ... 1 200 mm (43.35 ... 47.24 inch)		4 5
			Initial: 1 200 mm (47.24 inch)		
			1 201 ... 1 300 mm (47.28 ... 51.18 inch)		4 6
			Initial: 1 300 mm (51.18 inch)		
			1 301 ... 1 400 mm (51.22 ... 55.12 inch)		4 7
			Initial: 1 400 mm (55.12 inch)		
			1 401 ... 1 500 mm (55.16 ... 59.05 inch)		5 1
			Initial: 1 500 mm (59.05 inch)		
			Extension X		
			Standard length for Type 2G DIN 43772 (X=129 mm (5.08 inch))		1
			Extension length X - customer specific		
			enter customer specific length with Y45, see page 2/137 Order Codes		
			45 ... 150 mm (1.77 ... 5.91 inch)		9 N 1 D
			Initial: 150 mm (5.91 inch)		
			151 ... 300 mm (5.95 ... 11.81 inch)		9 N 2 D
			Initial: 300 mm (11.81 inch)		
			301 ... 450 mm (11.85 ... 17.72 inch)		9 N 3 D
			Initial: 450 mm (17.72 inch)		

Additional configurations on page after next page!

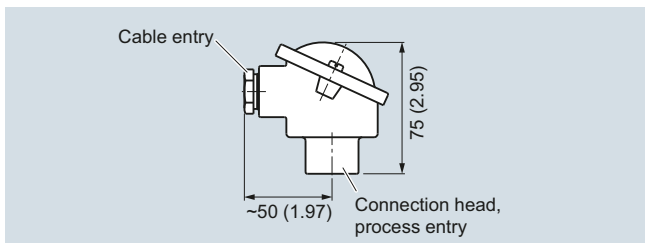
You find ordering examples on page 2/109!

Temperature Measurement

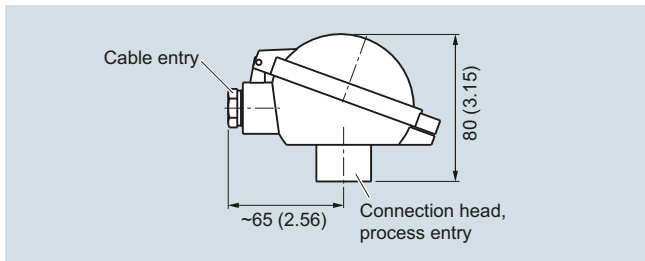
SITRANS TS500

Type 2G, tubular version with screw socket and extension

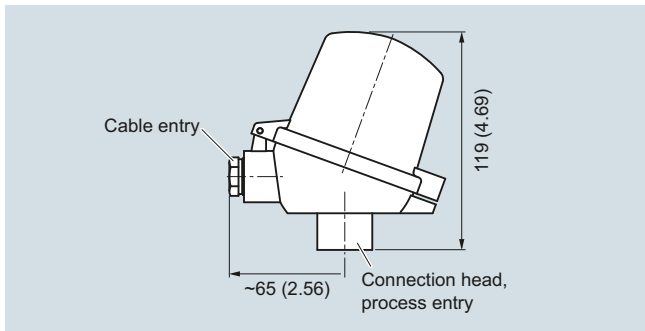
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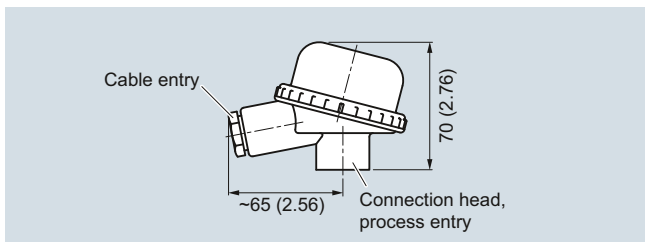
Connection head, aluminum, Type BA0, dimensions in mm (inch)



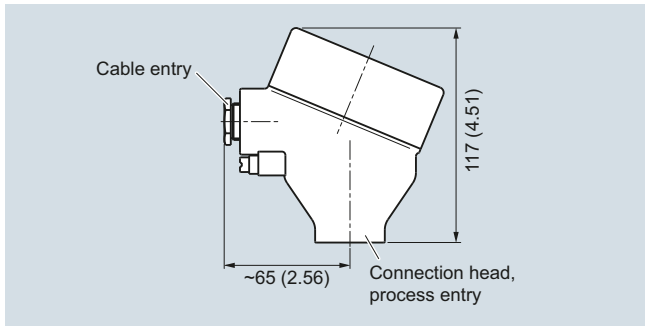
Connection head, aluminum, Type BB0, dimensions in mm (inch)



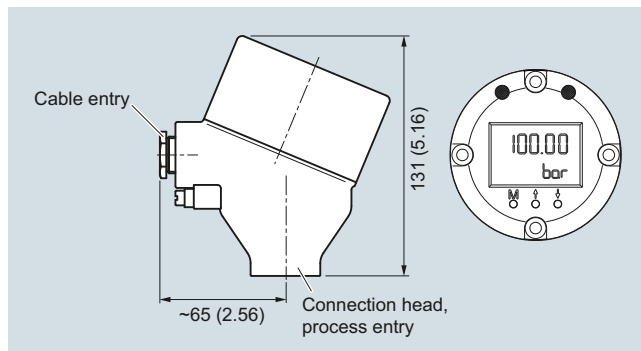
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Type 2G, tubular version with screw socket and extension

Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Order Code
SITRANS TS500 Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 2G, screwed in, with extension	7MC751-		Options Add "-Z" to Article No. and add options, separate extensions with "+".	
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0 high hinged cover, screw connection Stainless steel head, AU0, screw cover, suitable for Ex d Stainless steel head, AV0, screw cover, suitable for Ex d, display		A B C G H M P U V	Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, Basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1 112 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type J, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)		A B C K J N	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)		1 2 3 5 6 7	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Selection and Ordering data		Order Code	Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Further designs Add "-Z" to Article No. and specify Order Code.			Transmitter options Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44		Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with ½" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G01 G12 G13 G20 A02 A03
Extension X length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y45			

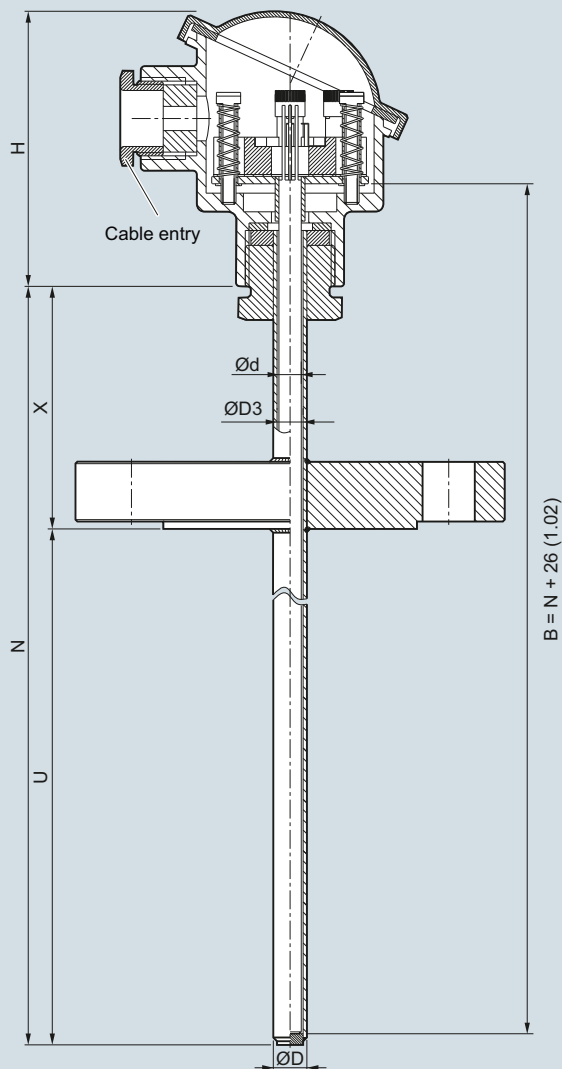
You find ordering examples on page 2/109!

Temperature Measurement

SITRANS TS500

Type 2F, tubular version with flange and extension

Dimensional drawings



- B Measuring insert length
- $\varnothing d$ Measuring insert outer diameter (6 (0.24))
- $\varnothing D$ Process connection outer diameter
- $\varnothing D3$ Thermowell internal diameter
- H Head height
- N Nominal length
- U Insertion length
- X Extension length

SITRANS TS500, temperature sensors for vessels and pipelines, tubular version for minimal to minimum to medium stress, thermowell as per DIN 43722, Type2F, with flange, with extension, dimensions in mm (inch)

Type 2F, tubular version with flange and extension

Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500 Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 2F, with flange, with extension	7MC751-		SITRANS TS500 Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 2F, with flange, with extension	7MC751-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Material, in contact with media					
316Ti (1.4571)	1		501...550 mm (19.72 ... 21.65 inch) Initial: 510 mm (20.08 inch)	3 1	
316L (1.4404 or 1.4435)	2		551...600 mm (21.69 ... 23.62 inch) Initial: 600 mm (23.62 inch)	3 2	
Process connection			601...650 mm (23.66 ... 25.59 inch) Initial: 650 mm (25.59 inch)	3 3	
Flange EN, DN25PN40 B1	2 A		651...700 mm (25.63 ... 27.56 inch) Initial: 700 mm (27.56 inch)	3 4	
Flange ASME, 1"RF150	2 E		701...750 mm (27.60 ... 29.53 inch) Initial: 750 mm (29.53 inch)	3 5	
Flange ASME, 1"RF300	2 F		751...800 mm (29.57 ... 31.50 inch) Initial: 800 mm (31.50 inch)	3 6	
Flange ASME, 1.5"RF150	2 G		801...850 mm (31.54 ... 33.46 inch) Initial: 850 mm (33.46 inch)	3 7	
Flange ASME, 1.5"RF300	2 H		851...900 mm (33.50 ... 35.43 inch) Initial: 900 mm (35.43 inch)	4 1	
Thermowell form			901...950 mm (35.47 ... 37.40 inch) Initial: 950 mm (37.40 inch)	4 2	
2F, 9 mm (0.35 inch)	A		951...1 000 mm (37.44 ... 39.37 inch) Initial: 1 000 mm (39.37 inch)	4 3	
2F, 12 mm (0.47 inch)	B		1 001...1 100 mm (39.41 ... 43.31 inch) Initial: 1 100 mm (43.31 inch)	4 4	
Insertion U standard			1 101...1 200 mm (43.35 ... 47.24 inch) Initial: 1 200 mm (47.24 inch)	4 5	
225 mm (8.86 inch)	1 1		1 201...1 300 mm (47.28 ... 51.18 inch) Initial: 1 300 mm (51.18 inch)	4 6	
315 mm (12.40 inch)	1 5		1 301...1 400 mm (51.22 ... 55.12 inch) Initial: 1 400 mm (55.12 inch)	4 7	
465 mm (18.31 inch)	2 6		1 401...1 500 mm (55.16 ... 59.05 inch) Initial: 1 500 mm (59.05 inch)	5 1	
Insertion length U customer-specific			Extension X		
enter customer specific length with Y44, see page 2/141 Order codes			Standard length for Type 2F DIN 43772 (X=64 mm (2.52 inch))	1	
80 ... 100 mm (3.15 ... 3.94 inch) Initial: 100 mm (3.94 inch)	0 1		Extension length X - customer specific		
101 ... 120 mm (3.98 ... 4.72 inch) Initial: 120 mm (4.72 inch)	0 2		enter customer specific length with Y45, see page 2/141 Order codes		
121 ... 140 mm (4.76 ... 5.51 inch) Initial: 140 mm (5.51 inch)	0 3		45 ... 150 mm (1.77 ... 5.91 inch) Initial: 150 mm (5.91 inch)	9	N 1 D
141 ... 160 mm (5.55 ... 6.30 inch) Initial: 160 mm (6.30 inch)	0 4		151 ... 300 mm (5.95 ... 11.81 inch) Initial: 300 mm (11.81 inch)	9	N 2 D
161 ... 180 mm (6.34 ... 7.09 inch) Initial: 180 mm (7.09 inch)	0 5		301 ... 450 mm (11.85 ... 17.72 inch) Initial: 450 mm (17.72 inch)	9	N 3 D
181 ... 200 mm (7.13 ... 7.87 inch) Initial: 200 mm (7.87 inch)	0 6				
201 ... 220 mm (7.91 ... 8.66 inch) Initial: 220 mm (8.66 inch)	0 7				
221 ... 240 mm (8.70 ... 9.45 inch) Initial: 225 mm (8.86 inch)	1 1				
241 ... 260 mm (9.49 ... 10.24 inch) Initial: 250 mm (9.84 inch)	1 2				
261 ... 280 mm (10.28 ... 11.02 inch) Initial: 280 mm (11.02 inch)	1 3				
281 ... 300 mm (11.06 ... 11.81 inch) Initial: 285 mm (11.22 inch)	1 4				
301 ... 320 mm (11.85 ... 13.00 inch) Initial: 315 mm (12.40 inch)	1 5				
321 ... 340 mm (12.64 ... 13.39 inch) Initial: 340 mm (13.39 inch)	1 6				
341 ... 360 mm (13.43 ... 14.17 inch) Initial: 360 mm (14.17 inch)	2 0				
361 ... 380 mm (14.21 ... 14.96 inch) Initial: 380 mm (14.96 inch)	2 1				
381 ... 400 mm (14.99 ... 15.75 inch) Initial: 400 mm (15.75 inch)	2 2				
401 ... 420 mm (15.79 ... 16.54 inch) Initial: 420 mm (16.54 inch)	2 3				
421 ... 440 mm (16.57 ... 17.32 inch) Initial: 440 mm (17.32 inch)	2 4				
441 ... 460 mm (17.36 ... 18.11 inch) Initial: 460 mm (18.11 inch)	2 5				
461 ... 480 mm (18.15 ... 18.90 inch) Initial: 465 mm (18.30 inch)	2 6				
481 ... 500 mm (18.94 ... 19.69 inch) Initial: 500 mm (19.69 inch)	2 7				

Additional configurations on page after next page!

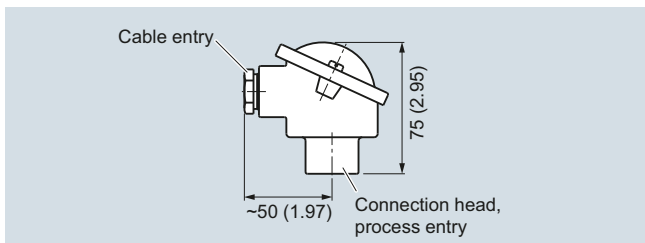
You find ordering examples on page 2/109!

Temperature Measurement

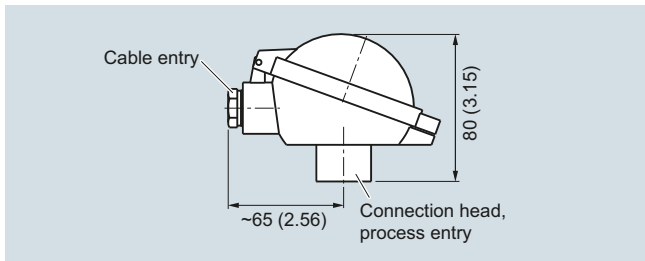
SITRANS TS500

Type 2F, tubular version with flange and extension

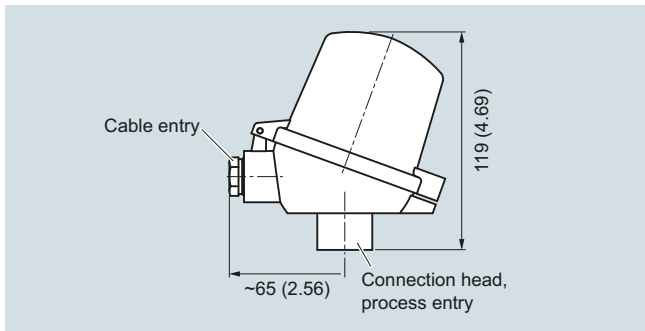
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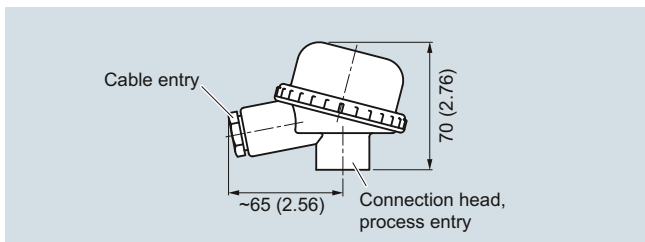
Connection head, aluminum, Type BA0, dimensions in mm (inch)



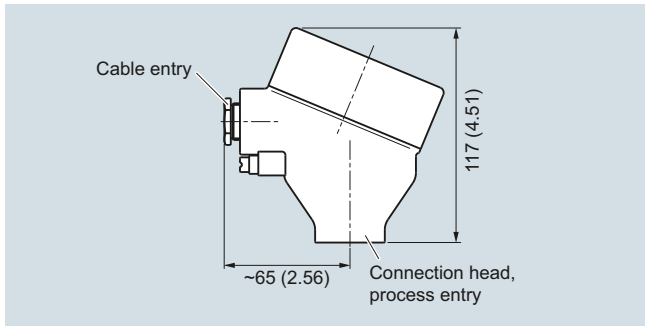
Connection head, aluminum, Type BB0, dimensions in mm (inch)



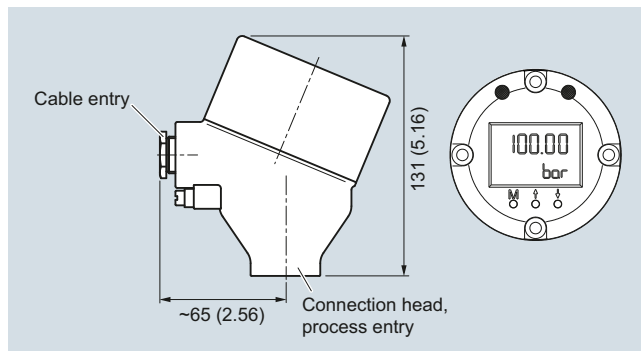
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Type 2F, tubular version with flange and extension

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS TS500	7MC751-	Options Add "-Z" to Article No. and add options, separate extensions with "+".	
Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 2F, with flange, with extension		Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0, high hinged cover, screw connection Stainless steel head, AU0, screw cover, suitable for Ex d Stainless steel head, AV0, screw cover, suitable for Ex d, display	A B C G H M P U V	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, Basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1 112 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type J, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)	A B C K J N	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)	1 2 3 5 6 7	Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Selection and Ordering data	Order code	Transmitter options Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Further designs Add "-Z" to Article No. and specify Order Code.		Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with 1/2" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G01 G12 G13 G20 A02 A03
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44		
Extension X length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y45		

You find ordering examples on page 2/109!

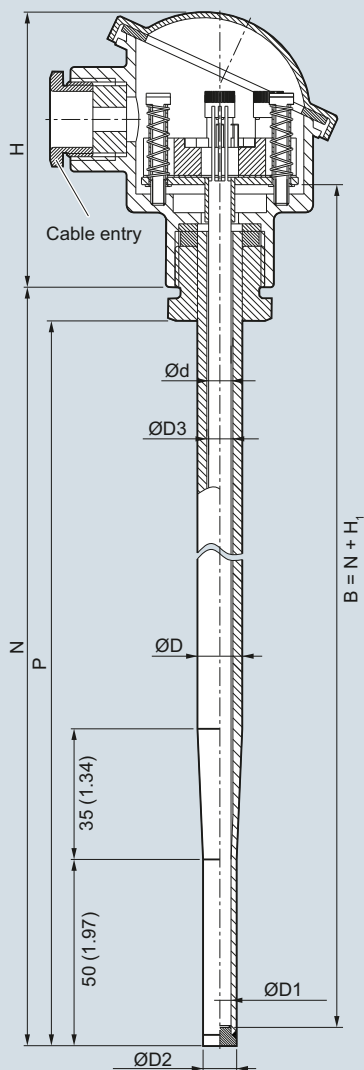
Temperature Measurement

SITRANS TS500

Type 3, tubular quick without process connection

Dimensional drawings

2



- B Measuring insert length
- Ød Measuring insert outer diameter (6 (0.24))
- ØD Process connection outer diameter
- ØD1 Tip internal diameter
- ØD2 Tip outer diameter
- ØD3 Thermowell diameter
- H Head height
- H₁ Typ Axx> 41 (1.61)
Typ Bxx> 26 (1.02)
- N Nominal length
- P Space for process connection

SITRANS TS500, temperature sensors for vessel and pipings, tubular version for minimum to medium stress, without process connection, with-out extension, plug-in or use with moveable compression fitting, dimension in mm (inch)

Type 3, tubular quick without process connection

2

Selection and Ordering data	Article No.
SITRANS TS500	7MC751-
Tubular version for minimal to medium stress, thermowell per DIN 43722, Type 3, without process connection, improved response time, plug-in or use with moveable compression fittings	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Material, in contact with media	
316Ti (1.4571)	1
316L (1.4404 or 1.4435)	2
Process connection	
Without process connection (for compression joints) N=U	0 N
Thermowell form	
3, 12/9 mm (0.47/0.35 inch)	K
Insertion length U (=N), Standard	
160 mm (6.3 inch)	0 4
220 mm (8.66 inch)	0 7
280 mm (11.02 inch)	1 3
Insertion length U (=N), customer-specific	
enter customer specific length with Y44, see page 2/145 Order Codes	
121 ... 140 mm (4.76 ... 5.51 inch) Initial: 140 mm (5.51 inch)	0 3
141 ... 160 mm (5.55 ... 6.30 inch) Initial: 160 mm (6.3 inch)	0 4
161 ... 180 mm (6.34 ... 7.09 inch) Initial: 180 mm (7.09 inch)	0 5
181 ... 200 mm (7.13 ... 7.87 inch) Initial: 200 mm (7.87 inch)	0 6
201 ... 220 mm (7.91 ... 8.66 inch) Initial: 220 mm (8.66 inch)	0 7
221 ... 240 mm (8.7 ... 9.45 inch) Initial: 225 mm (8.86 inch)	1 1
241 ... 260 mm (9.48 ... 10.24 inch) Initial: 250 mm (9.84 inch)	1 2
261 ... 280 mm (10.28 ... 11.02 inch) Initial: 280 mm (11.02 inch)	1 3
281 ... 300 mm (11.02 ... 11.81 inch) Initial: 285 mm (11.22 inch)	1 4
301 ... 320 mm (11.85 ... 12.6 inch) Initial: 315 mm (12.4 inch)	1 5
321 ... 340 mm (12.64 ... 13.39 inch) Initial: 340 mm (13.39 inch)	1 6
341 ... 360 mm (13.43 ... 14.17 inch) Initial: 360 mm (14.17 inch)	2 0
361 ... 380 mm (14.21 ... 14.96 inch) Initial: 380 mm (14.96 inch)	2 1

Selection and Ordering data	Article No.
SITRANS TS500	7MC751-
Tubular version for minimal to medium stress, thermowell per DIN 43722, Type 3, without process connection, improved response time, plug-in or use with moveable compression fittings	
381 ... 400 (15 ... 15.75 inch) Initial: 400 mm (15.75 inch)	2 2
401 ... 420 (15.79 ... 16.54 inch) Initial: 420 mm (16.54 inch)	2 3
421 ... 440 (16.57 ... 17.32 inch) Initial: 440 mm (17.32 inch)	2 4
441 ... 460 (17.36 ... 18.11 inch) Initial: 460 mm (18.11 inch)	2 5
461 ... 480 (18.15 ... 18.90 inch) Initial: 465 mm (18.30 inch)	2 6
481 ... 500 (18.94 ... 19.68 inch) Initial: 500 mm (19.68 inch)	2 7
501 ... 550 (19.72 ... 21.65 inch) Initial: 510 mm (20.08 inch)	3 1
551 ... 600 (21.69 ... 23.62 inch) Initial: 600 mm (23.62 inch)	3 2
601 ... 650 (23.66 ... 25.59 inch) Initial: 650 mm (25.59 inch)	3 3
651 ... 700 (25.63 ... 27.56 inch) Initial: 700 mm (27.56 inch)	3 4
701 ... 750 (27.6 ... 29.53 inch) Initial: 750 mm (29.53 inch)	3 5
751 ... 800 (29.57 ... 31.50 inch) Initial: 800 mm (31.50 inch)	3 6
801 ... 850 mm (31.53 ... 33.46 inch) Initial: 850 mm (33.46 inch)	3 7
851 ... 900 mm (33.50 ... 35.43 inch) Initial: 900 mm (35.43 inch)	4 1
901 ... 950 mm (35.47 ... 37.40 inch) Initial: 950 mm (37.40 inch)	4 2
951 ... 1 000 mm (37.44 ... 39.37 inch) Initial: 1 000 mm (39.37 inch)	4 3
1 001 ... 1 100 mm (39.41 ... 43.31 inch) Initial: 1 100 mm (43.31 inch)	4 4
Extension	
Standard length for Type 2 as per DIN 43722 (without extension N=U)	0

Additional configurations on page after next page!

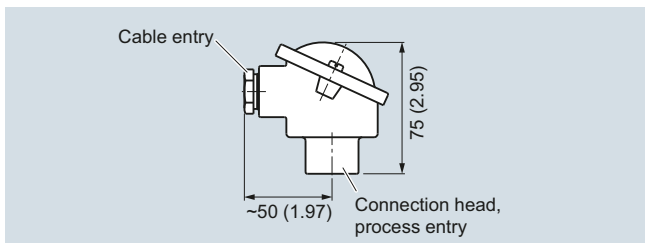
You find ordering examples on page 2/109!

Temperature Measurement

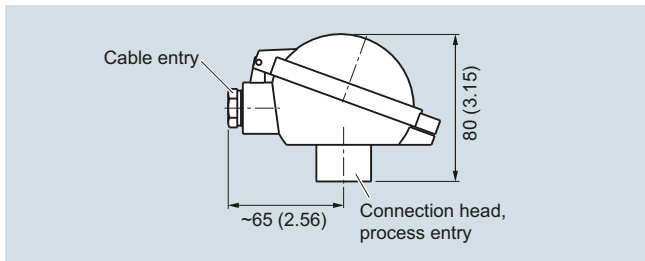
SITRANS TS500

Type 3, tubular quick without process connection

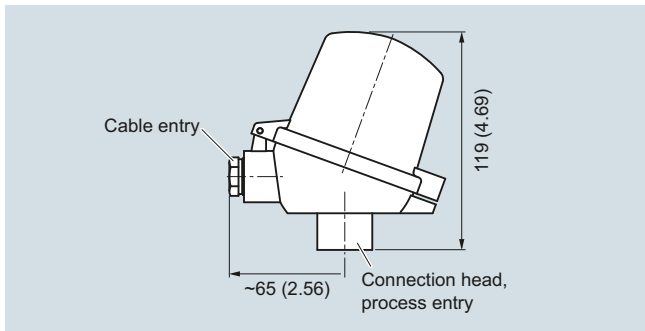
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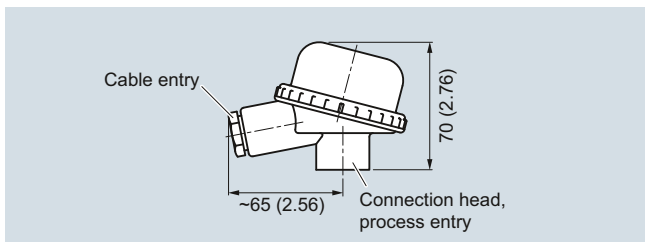
Connection head, aluminum, Type BA0, dimensions in mm (inch)



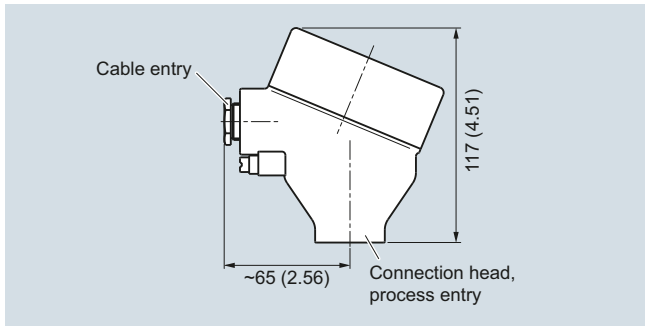
Connection head, aluminum, Type BB0, dimensions in mm (inch)



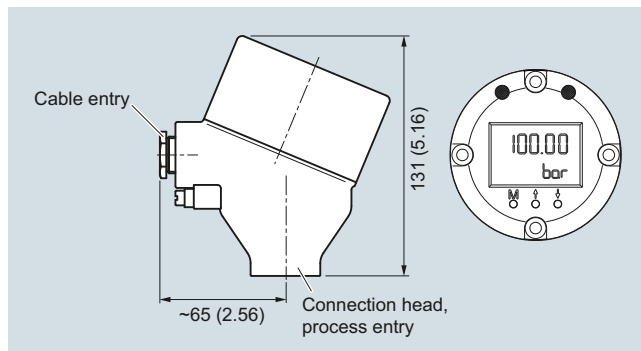
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Type 3, tubular quick without process connection

2

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS TS500	7MC751-	Options Add "-Z" to Article No. and add options, separate extensions with "+" .	
Tubular version for minimal to medium stress, thermowell as per DIN 43722, Type 3, without process connection, improved response time, plug-in or use with moveable compression fittings		Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0high hinged cover, screw connection Stainless steel head, AU0, screw cover, Ex d Stainless steel head, AV0, screw cover, suitable for Ex d, display	A B C G H M P U V	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration-resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1112 °F) Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)	A B C J K N	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)	1 2 3 5 6 7	Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Selection and Ordering data	Order code	Transmitter options Transmitter, enter complete setting in plain text (Y01:+/NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Further designs Add "-Z" to Article No. and specify Order Code.		Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug(in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with ½" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0 Compression joint G½", enclosed Compression joint NPT½", enclosed	G01 G12 G13 G20 A02 A03 A31 A32
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44		

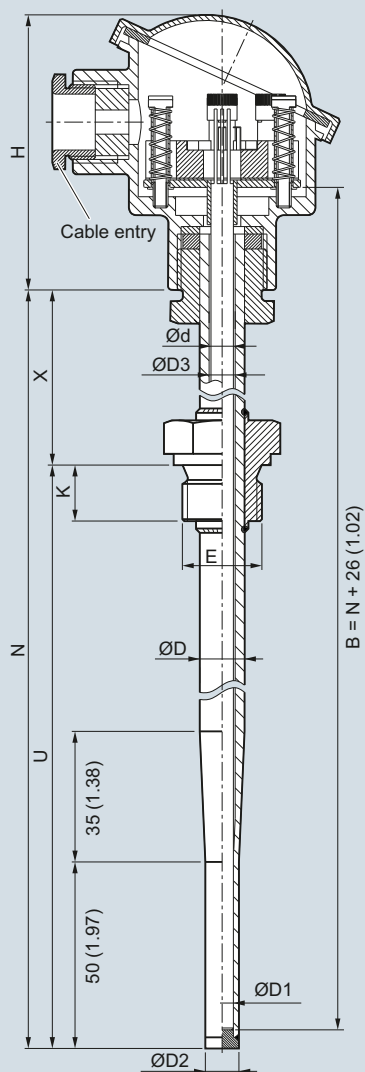
You find ordering examples on page 2/109!

Temperature Measurement

SITRANS TS500

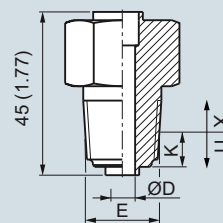
Type 3G, tubular quick with screw socket and extension

Dimensional drawings



- B Measuring insert length
- Ød Measuring insert outer diameter (6 (0.24))
- ØD Process connection outer diameter
- ØD1 Tip internal diameter
- ØD2 Tip outer diameter
- ØD3 Thermowell internal diameter
- E Process connection, thread size
- H Head height
- K Screw depth
- N Nominal length
- U Insertion length
- X Extension length

SITRANS TS500, temperature sensors for vessels and pipelines, tubular version for minimal to minimum to medium stress, thermowell as per DIN 43722, Type 3G, screwed in, with extension, dimensions in mm (inch)



Tapered process connection, dimensions in mm (inch)

Type 3G, tubular quick with screw socket and extension

Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500	7MC751-	
Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 3G, screwed in, with extension		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Material, in contact with media		
316Ti (1.4571)	1	
316L (1.4404 or 1.4435)	2	
Process connection		
Cylindrical: G½" inch (½" BSPF)	1 C	
Cylindrical: G1" inch (1" BSPF)	1 E	
Tapered: NPT½"	1 J	
Thermowell form		
3G, 12/9 mm (0.47/0.35 inch)		K
Insertion length U standard		
160 mm (6.30 inch)		0 4
220 mm (8.66 inch)		0 7
280 mm (11.02 inch)		1 3
Insertion length U customer-specific		
enter customer specific length with Y44, see page 2/149 Order Codes		
121 ... 140 mm (4.76 ... 5.51 inch) Initial: 140 mm (5.51 inch)		0 3
141 ... 160 mm (5.55 ... 6.30 inch) Initial: 160 mm (6.30 inch)		0 4
161 ... 180 mm (6.34 ... 7.09 inch) Initial: 180 mm (7.09 inch)		0 5
181 ... 200 mm (7.13 ... 7.87 inch) Initial: 200 mm (7.87 inch)		0 6
201 ... 220 mm (7.91 ... 8.66 inch) Initial: 220 mm (8.66 inch)		0 7
221 ... 240 mm (8.70 ... 9.45 inch) Initial: 225 mm (8.86 inch)		1 1
241 ... 260 mm (9.49 ... 10.24 inch) Initial: 250 mm (9.84 inch)		1 2
261 ... 280 mm (10.28 ... 11.02 inch) Initial: 280 mm (11.02 inch)		1 3
281 ... 300 mm (11.06 ... 11.81 inch) Initial: 285 mm (11.22 inch)		1 4
301 ... 320 mm (11.85 ... 13.00 inch) Initial: 315 mm (12.40 inch)		1 5
321 ... 340 mm (12.64 ... 13.39 inch) Initial: 340 mm (13.39 inch)		1 6
341 ... 360 mm (13.43 ... 14.17 inch) Initial: 360 mm (14.17 inch)		2 0
361 ... 380 mm (14.21 ... 14.96 inch) Initial: 380 mm (14.96 inch)		2 1
381 ... 400 mm (14.99 ... 15.75 inch) Initial: 400 mm (15.75 inch)		2 2
401 ... 420 mm (15.79 ... 16.54 inch) Initial: 420 mm (16.54 inch)		2 3
421 ... 440 mm (16.57 ... 17.32 inch) Initial: 440 mm (17.32 inch)		2 4
441 ... 460 mm (17.36 ... 18.11 inch) Initial: 460 mm (18.11 inch)		2 5
461 ... 480 mm (18.15 ... 18.90 inch) Initial: 465 mm (18.30 inch)		2 6
481 ... 500 mm (18.94 ... 19.69 inch) Initial: 500 mm (19.69 inch)		2 7

Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500	7MC751-	
Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 3G, screwed in, with extension		
501 ... 550 mm (19.72 ... 21.65 inch) Initial: 510 mm (20.08 inch)		3 1
551 ... 600 mm (21.69 ... 23.62 inch) Initial: 600 mm (23.62 inch)		3 2
601 ... 650 mm (23.66 ... 25.59 inch) Initial: 650 mm (25.59 inch)		3 3
651 ... 700 mm (25.63 ... 27.56 inch) Initial: 700 mm (27.56 inch)		3 4
701 ... 750 mm (27.6 ... 29.53 inch) Initial: 750 mm (29.53 inch)		3 5
751 ... 800 mm (29.57 ... 31.50 inch) Initial: 800 mm (31.50 inch)		3 6
801 ... 850 mm (31.53 ... 33.46 inch) Initial: 850 mm (33.46 inch)		3 7
851 ... 900 mm (33.50 ... 35.43 inch) Initial: 900 mm (35.43 inch)		4 1
901 ... 950 mm (35.47 ... 37.40 inch) Initial: 950 mm (37.40 inch)		4 2
951 ... 1 000 mm (37.44 ... 39.37 inch) Initial: 1 000 mm (39.37 inch)		4 3
Extension X		
Standard length for Type 2G DIN 43772 (X=131 mm (5.08 inch))		1
Extension length - customer specific		
enter customer specific length with Y45, see page 2/149 Order Codes		
55 ... 150 mm (2.17 ... 5.91 inch) Initial: 150 mm (5.91 inch)		9 N 1 D
151 ... 300 mm (5.95 ... 11.81 inch) Initial: 300 mm (11.81 inch)		9 N 2 D

Additional configurations on page after next page!

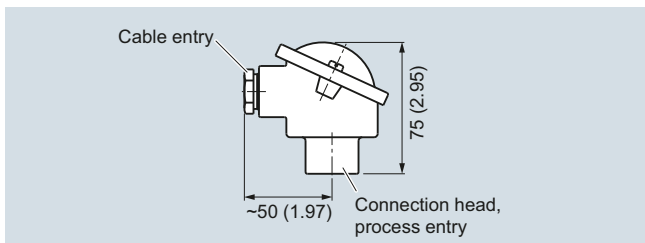
You find ordering examples on page 2/109!

Temperature Measurement

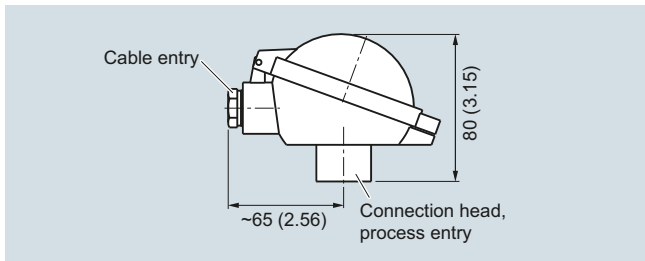
SITRANS TS500

Type 3G, tubular quick with screw socket and extension

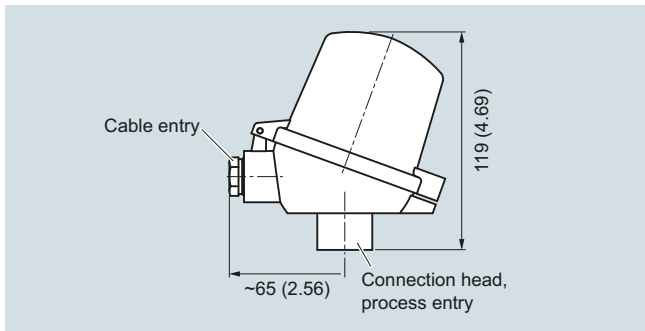
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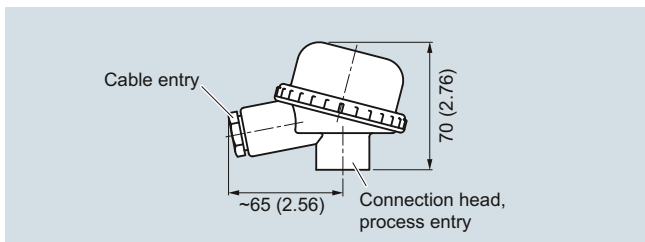
Connection head, aluminum, Type BA0, dimensions in mm (inch)



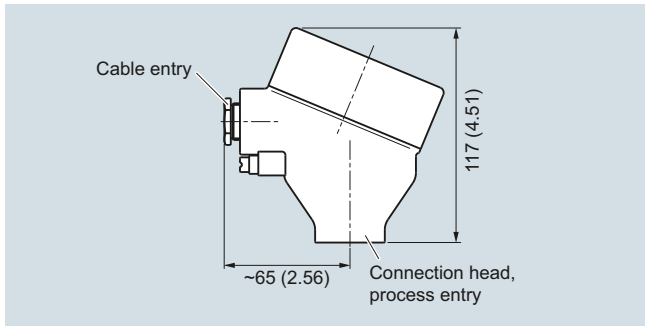
Connection head, aluminum, Type BB0, dimensions in mm (inch)



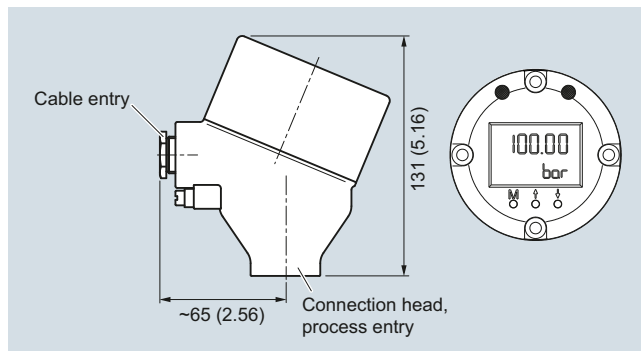
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Type 3G, tubular quick with screw socket and extension

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS TS500 Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 3G, screwed in, with extension	7MC751-	Options Add "-Z" to Article No. and add options, separate extensions with "+" .	
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0 high hinged cover, screw connection Stainless steel head, AU0, screw cover, Ex d Stainless steel head, screw cover, Ex d, display	A B C G H M P U V	Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... 1112 °F) Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type N, -40 ... +000 °C (-40 ... +1 832 °F)	A B C J K N	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)	1 2 3 5 6 7	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Selection and Ordering data	Order code	Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Further designs Add "-Z" to Article No. and specify Order Code.		Transmitter options Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44	Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with 1/2" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G01 G12 G13 G20 A02 A03
Extension length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y45		

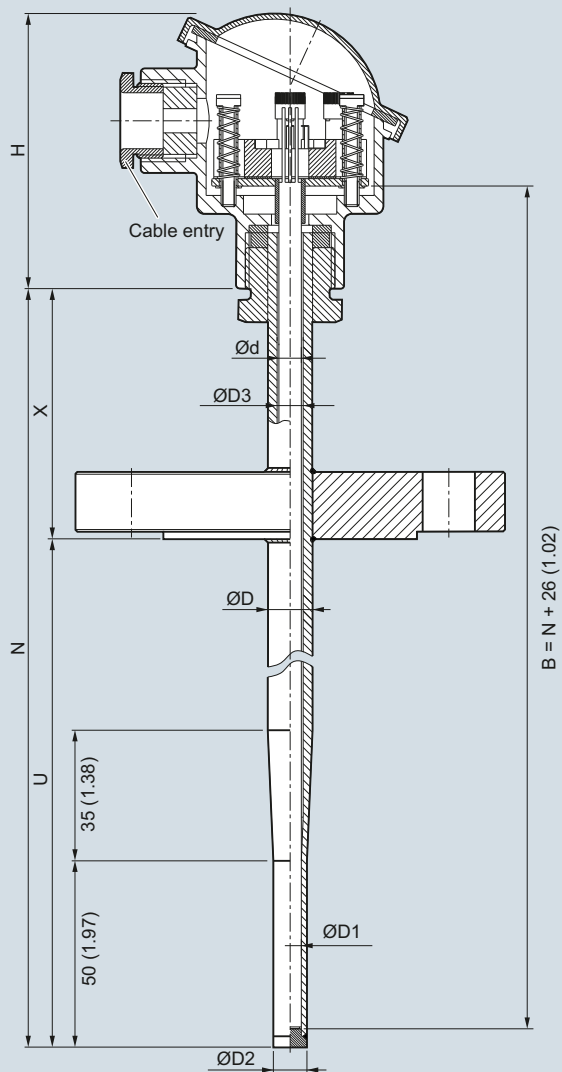
You find ordering examples on page 2/109!

Temperature Measurement

SITRANS TS500

Type 3F, tubular quick with flange and extension

Dimensional drawings



- B Measuring insert length
- Ød Measuring insert outer diameter (6 (0.24))
- ØD Process connection outer diameter
- ØD1 Tip internal diameter
- ØD2 Tip outer diameter
- ØD3 Thermowell internal diameter
- H Head height
- N Nominal length
- U Insertion length
- X Extension length

SITRANS TS500, temperature sensors for vessels and pipelines, tubular version for minimal to minimum to medium stress, thermowell as per DIN 43722, Type 3F, with flange, with extension, dimensions in mm (inch)

Type 3F, tubular quick with flange and extension

Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500	7MC751-	
Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 3F, with flange, with extension		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Material, in contact with media		
316Ti (1.4571)	1	
316L (1.4404 or 1.4435)	2	
Process connection		
Flange EN; DN25PN40 B1	2 A	
Flange ASME; 1"RF150	2 E	
Flange ASME; 1"RF300	2 F	
Flange ASME; 1.5"RF150	2 G	
Flange ASME; 1.5"RF300	2 H	
Thermowell form		
3F; 12/9 mm (0.47/0.35 inch)	K	
Insertion length U standard		
225 mm (8.86 inch)	1 1	
285 mm (11.22 inch)	1 4	
345 mm (13.58 inch)	1 7	
Insertion length U customer-specific enter customer specific length with Y44, see page 2/153 Order Codes		
121 ... 140 mm (4.76 ... 5.51 inch) Initial: 140 mm (5.51 inch)	0 3	
141 ... 160 mm (5.55 ... 6.30 inch) Initial: 160 mm (6.3 inch)	0 4	
161 ... 180 (6.34 ... 7.09 inch) Initial: 180 mm (7.09)	0 5	
181 ... 200 (7.13 ... 7.87 inch) Initial: 200 mm (7.87 inch)	0 6	
201 ... 220 (7.91 ... 8.66 inch) Initial: 220 mm (8.66 inch)	0 7	
221 ... 240 (8.7 ... 9.45 inch) Initial: 225 mm (8.86 inch)	1 1	
241 ... 260 (9.48 ... 10.24 inch) Initial: 250 mm (9.84 inch)	1 2	
261 ... 280 (10.28 ... 11.02 inch) Initial: 280 mm (11.02 inch)	1 3	
281 ... 300 (11.02 ... 11.81 inch) Initial: 285 mm (11.22 inch)	1 4	
301 ... 320 (11.85 ... 12.6 inch) Initial: 315 mm (12.4 inch)	1 5	
321 ... 340 (12.64 ... 13.39 inch) Initial: 340 mm (13.39 inch)	1 6	
341 ... 360 (13.43 ... 14.17 inch) Initial: 345 mm (13.58 inch)	1 7	
361 ... 380 (14.21 ... 14.96 inch) Initial: 380 mm (14.96 inch)	2 1	
381 ... 400 (15 ... 15.75 inch) Initial: 400 mm (15.75 inch)	2 2	
401 ... 420 (15.79 ... 16.54 inch) Initial: 420 mm (16.54 inch)	2 3	
421 ... 440 (16.57 ... 17.32 inch) Initial: 440 mm (17.32 inch)	2 4	
441 ... 460 (17.36 ... 18.11 inch) Initial: 460 mm (18.11 inch)	2 5	
461 ... 480 (18.15 ... 18.90 inch) Initial: 465 mm (18.30 inch)	2 6	
481 ... 500 (18.94 ... 19.68 inch) Initial: 500 mm (19.68 inch)	2 7	

Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500	7MC751-	
Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 3F, with flange, with extension		
501 ... 550 mm (19.72 ... 21.65 inch) Initial: 510 mm (20.08 inch)	3 1	
551 ... 600 mm (21.69 ... 23.62 inch) Initial: 600 mm (23.62 inch)	3 2	
601 ... 650 mm (23.66 ... 25.59 inch) Initial: 650 mm (25.59 inch)	3 3	
651 ... 700 mm (25.63 ... 27.56 inch) Initial: 700 mm (27.56 inch)	3 4	
701 ... 750 mm (27.6 ... 29.53 inch) Initial: 750 mm (29.53 inch)	3 5	
751 ... 800 mm (29.57 ... 31.50 inch) Initial: 800 mm (31.50 inch)	3 6	
801 ... 850 mm (31.53 ... 33.46 inch) Initial: 850 mm (33.46 inch)	3 7	
851 ... 900 mm (33.50 ... 35.43 inch) Initial: 900 mm (35.43 inch)	4 1	
901 ... 950 mm (35.47 ... 37.40 inch) Initial: 950 mm (37.40 inch)	4 2	
951 ... 1 000 mm (37.44 ... 39.37 inch) Initial: 1 000 mm (39.37 inch)	4 3	
1 001 ... 1 100 mm (39.41 ... 43.31 inch) Initial: 1 100 mm (43.31 inch)	4 4	
Extension		
Standard length for Type 2G DIN 43772 (X=66 mm (2.60 inch))	1	
Extension length - customer specific enter customer specific length with Y45, see page 2/153 Order Codes		
55 ... 150 mm (2.17 ... 5.91 inch) Initial: 150 mm (5.91 inch)	9	N 1 D
151 ... 300 mm (5.95 ... 11.81 inch) Initial: 300 mm (11.81 inch)	9	N 2 D

Additional configurations on page after next page!

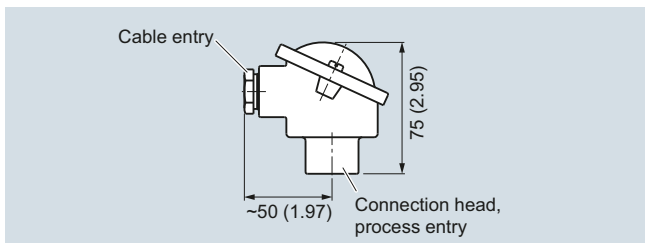
You find ordering examples on page 2/109!

Temperature Measurement

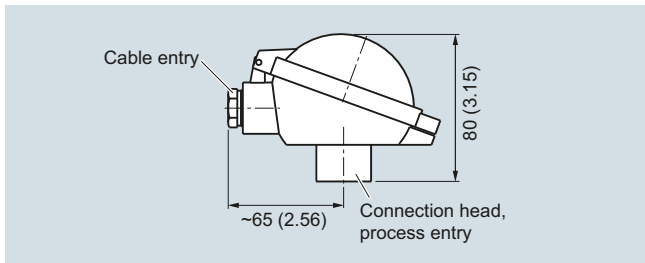
SITRANS TS500

Type 3F, tubular quick with flange and extension

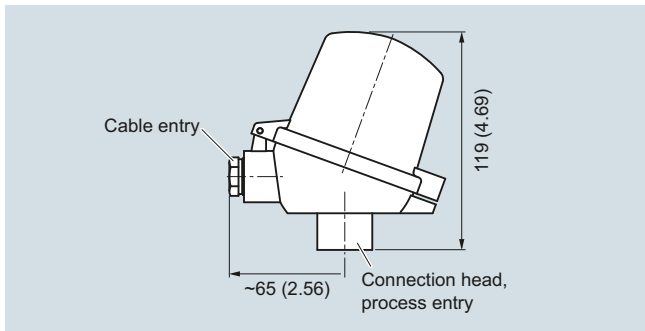
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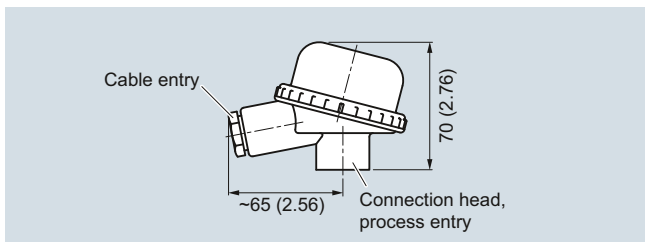
Connection head, aluminum, Type BA0, dimensions in mm (inch)



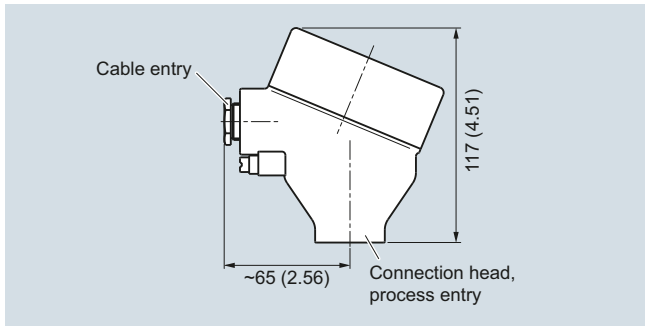
Connection head, aluminum, Type BB0, dimensions in mm (inch)



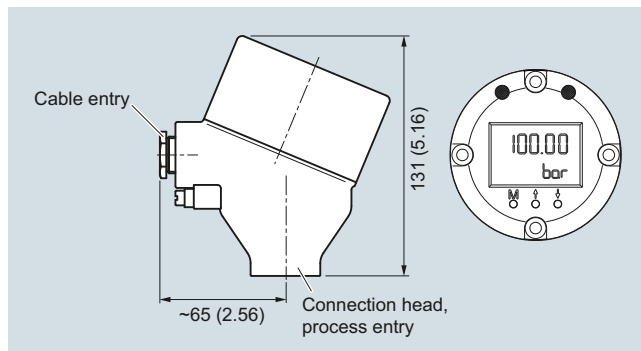
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Type 3F, tubular quick with flange and extension

Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Order code
SITRANS TS500 Tubular thermowell, minimal to medium stress, thermowell as per DIN 43722, Type 3F, with flange, with extension	7MC751-		Options Add "-Z" to Article No. and add options, separate extensions with "+" .	
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BP0 high hinged cover, screw connection Stainless steel head, AU0, screw cover, Ex d Stainless steel head, screw cover, Ex d, display		A B C G H M P U V	Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration.resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1112 °F) Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)		A B C J K N	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)		1 2 3 5 6 7	Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C51
Selection and Ordering data			Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Further designs Add "-Z" to Article No. and specify Order Code.			Transmitter options Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)		Y44	Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with 1/2" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G01 G12 G13 G20 A02 A03
Extension length customer-specific Select range, enter desired length in plain text (No entry = standard length)		Y45		

You find ordering examples on page 2/109!

Temperature Measurement

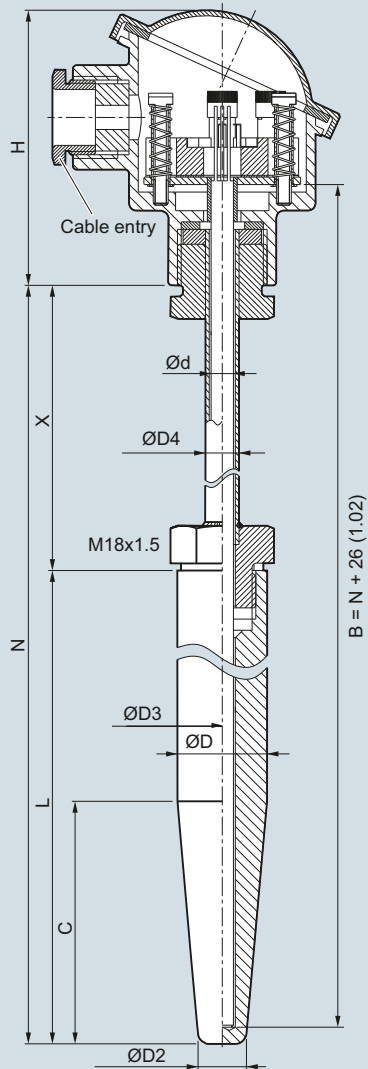
SITRANS TS500

Type 4+4F barstock thermowell, with extension

Dimensional drawings

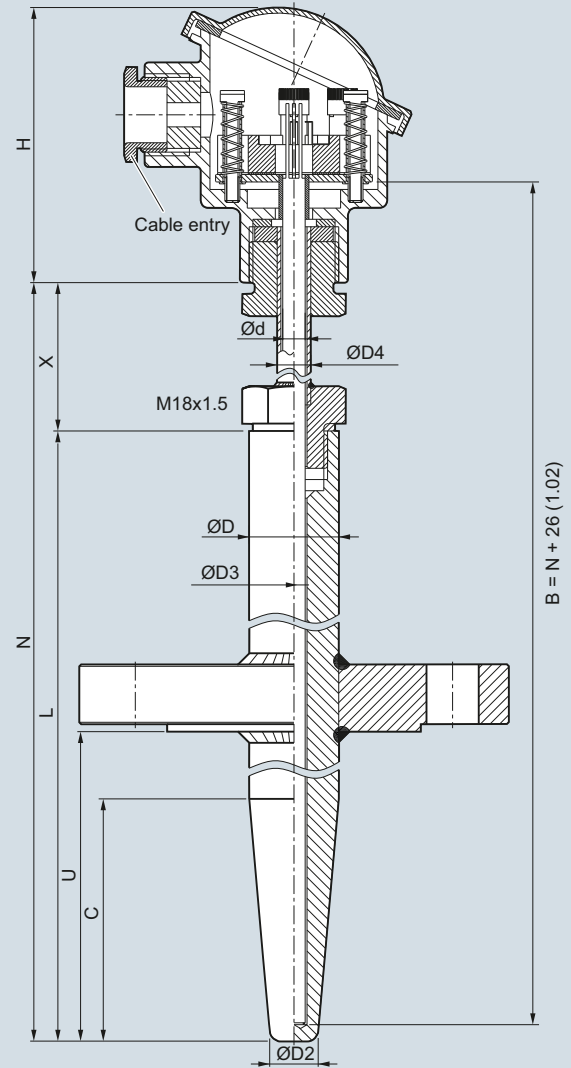
SITRANS TS500, temperature sensors for vessels and pipelines, barstock version for minimal to minimum to medium stress, thermowell as per DIN 43722.

2



- B Measuring insert length
- C Cone length = U_{\min}
- Ød Measuring insert outer diameter (6 (0.24))
- ØD Process connection outer diameter
- ØD2 Tip outer diameter
- ØD3 Thermowell internal diameter
- ØD4 Extension outer diameter
- H Head height
- L Length of thermowell
- N Nominal length
- X Extension length

Thermowell type 4, for welding in, with extension, dimensions in mm (inch)



- B Measuring insert length
- C Cone length = U_{\min}
- Ød Measuring insert outer diameter (6 (0.24))
- ØD Process connection outer diameter
- ØD2 Tip outer diameter
- ØD3 Thermowell internal diameter
- ØD4 Extension outer diameter
- H Head height
- L Length of thermowell
- N Nominal length
- U Insertion length (Standard: $U = L - 70$ (2.76))
- X Extension length

Thermowell type 4F, with flange, with extension, dimensions in mm (inch)

Type 4+4F barstock thermowell, with extension

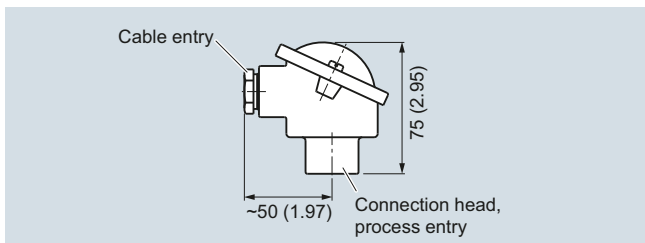
Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500	7MC752-		SITRANS TS500	7MC752-	
Barstock thermowell for medium to highest stress, thermowell as per DIN 43722, Type 4, for welding in, Type 4F with flange, with extension			Barstock thermowell for medium to highest stress, thermowell as per DIN 43722, Type 4, for welding in, Type 4F with flange, with extension		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Material, in contact with media			Head		
316Ti (1.4571)	1		Aluminum head, BA0, flange cover, Standard		A
316L (1.4404 or 1.4435)	2		Aluminum head, BB0, low hinged cover, screw connection		B
1.7335 heat resistant, only for versions without flange	3		Aluminum head, BC0, high hinged cover, screw connection		C
1.5415 heat resistant, only for versions without flange	4		Aluminum head, AG0, screw cover, suitable for Ex d		G
			Aluminum head, AH0, screw cover, suitable for Ex d, display		H
Process connection			Plastic head, BMO, screw cover		M
Without (for welding in)	0 N		Plastic head, BPOhigh hinged cover, screw connection		P
Flange DN25 PN40 B1	2 A		Stainless steel head, AU0, screw cover, Ex d		U
Flange 1"RF150	2 E		Stainless steel head, AV0, screw cover, Ex d, display		V
Flange 1"RF300	2 F				
Flange 1.5"RF150	2 G		Sensor		
Flange 1.5"RF300	2 H		Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88		
Thermowell form			Pt100, basis, -50 ... +400 °C (-58 ... +752)		A
For flanged types only: specify with Y44 in plain text if insertion length "U" deviates from standard (U=L-70 mm (2.76 inch)). (Min: U = C; Max; U= L-50 mm (1.97 inch))			Pt100, vibration resistant, -50 ... +400 °C (-58 ... +752)		B
Specify with Y46 in plain text if protective tube length "L" deviates from standard			Pt100, expanded range, -196 ... 600 °C (-321 ... +1 112)		C
Type 4/4F,			Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832)		K
L=140 (5.51 inch), C= 65 (3.74 inch), Ød=24 (0.95 inch), Ød=6 (0.24 inch)			Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382)		J
Type 4/4F,			Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832)		N
L=200 (7.87 inch), C= 65 (3.74 inch), Ød=24 (0.95 inch), Ød=6 (0.24 inch)					
Type 4/4F,			Sensor number/Accuracy		
L=200 (7.87 inch), C= 125 (4.92 inch), Ød=24 (0.95 inch), Ød=6 (0.24 inch)			Single, basic accuracy (Class 2/Class B)		1
Type 4/4F,			Single, increased accuracy (Class 1/Class A)		2
L=260 (10.24 inch), C= 125 (4.92 inch), Ød=24 (0.95 inch), Ød=6 (0.24 inch)			Single, highest accuracy (Class AA)		3
			Double, basic accuracy (Class 2/Class B)		5
Extension X			Double, increased accuracy (Class 1/Class A)		6
as per DIN 43772			Double, highest accuracy (Class AA)		7
(X=149 mm (5.87 inch))					
Extension X, customer-specific			Additional configurations on page after next page!		
enter customer specific length with Y45, see page 2/157 Order Codes			You find ordering examples on page 2/109!		
55 ... 150 mm (2.17 ... 5.91 inch)	9	N 1 D			
Initial: 150 mm (5.91 inch)					
151 ... 300 mm (5.95 ... 11.81 inch)	9	N 2 D			
Initial: 300 mm (11.81 inch)					
301 ... 450 mm (11.85 ... 17.72 inch)	9	N 3 D			
Initial: 450 mm (17.72 inch)					
451 ... 600 mm (17.86 ... 23.62 inch)	9	N 4 D			
Initial: 600 mm (23.62 inch)					
601 ... 750 mm (23.66 ... 29.53 inch)	9	N 5 D			
Initial: 750 mm (29.53 inch)					
751 ... 900 mm (29.57 ... 45.43 inch)	9	N 6 D			
Initial: 900 mm (45.43 inch)					
901 ... 1 050 mm (45.47 ... 41.34 inch)	9	N 7 D			
Initial: 1 050 mm (41.34 inch)					

Temperature Measurement

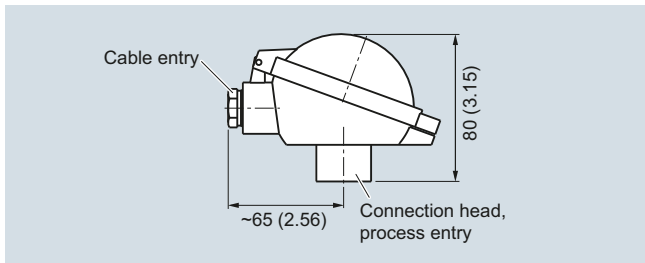
SITRANS TS500

Type 4+4F barstock thermowell, with extension

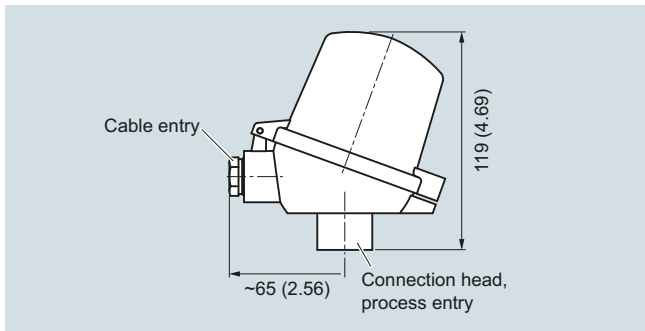
2



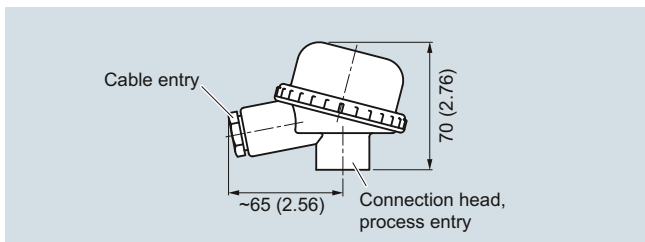
Connection head, aluminum, Type BA0, dimensions in mm (inch)



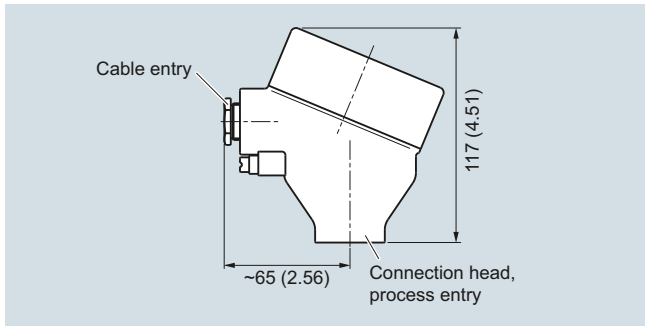
Connection head, aluminum, Type BB0, dimensions in mm (inch)



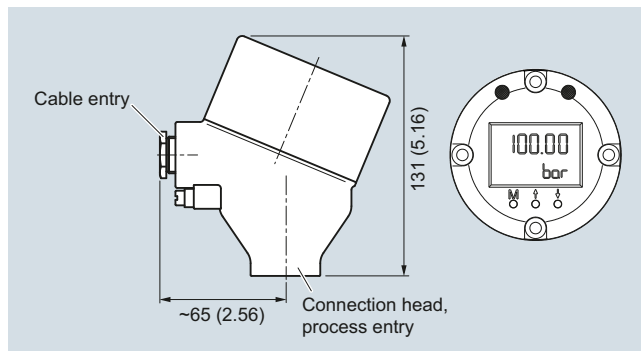
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order Code.		Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Insertion length customer-specific Select range, enter desired length in plain text Insertion length U deviating from standard; (Min: U = C; Max; U= L-50 mm (1.97 inch)), no entry = standard length (U=L-70 mm (2.76 inch))	Y44	Transmitter options Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text	Y01 Y17
Extension length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y45	Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y23 Y24 Y25 U36 C20 C23 C11
Options Add "-Z" to Article No. and add options, separate extensions with "+".		Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector) Connection head with ½ NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G01 G12 G13 G20 A02 A03
Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46	You find ordering examples on page 2/109!	
Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04		
Certificates and approvals EN10204-3.1 Inspection certificate for materials coming into contact with media EN10204-3.1 Inspection certificate for hydrostatic pressure test EN10204-3.1 Inspection certificate for helium leak test EN10204-3.1 Inspection certificate for surface tear test EN10204-3.1 Inspection certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order NACE Standard MR-01-75 compliance ISO 9001 grease-free (cleaned for e.g. oxygen applications)	C12 C31 C32 C33 C34 C35 C50 C51		

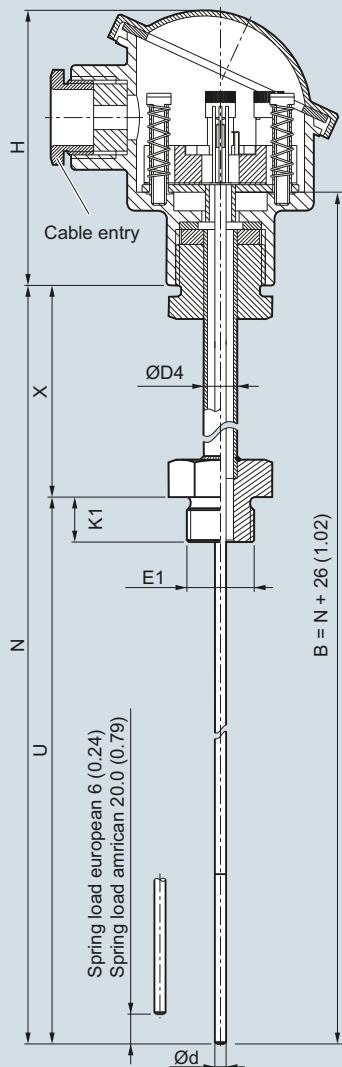
Temperature Measurement

SITRANS TS500

For the installation of existing protective tubes

Dimensional drawings

2



B	Measuring insert length
Ød	Measuring insert outer diameter
ØD4	Extension outer diameter
E1	Process connection, thread size
H	Head height
K1	Screw depth
N	Nominal length
U	Insertion length
X	Extension length

Recommended rebound = inside length of the protective tube + 3 (0.12)

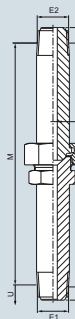
SITRANS TS500, temperature sensors for vessels and pipings, temperature sensors for installation in existing thermowells, suitable for thermowells as per DIN 43772 as well as ASME B40.9-2001 with extension European or American types, dimensions in mm (inch)



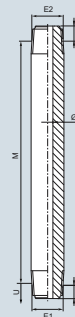
Neck tube (1, 2, 3), adjustable, european, cylindrical, dimensions in mm (inch)



Neck tube NPT (1, 2, 3), adjustable, european, conical, dimensions in mm (inch)



Neck tube NUN, adjustable, conical, european (5), american (8), dimensions in mm (inch)



Neck tube, nipple, non adjustable, conical, european (4), american (6), dimensions in mm (inch)

¹⁾ Numerics 1 ... 8: s. Selection and Ordering data option extension page 2/159

Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Article No.	Ord. Code
SITRANS TS500 Temperature sensors for installation in existing thermowells, suitable for thermowells as per DIN 43772 as well as ASME B40.9-2001 with extension European or American types	7MC7500-		SITRANS TS500 Temperature sensors for installation in existing thermowells, suitable for thermowells as per DIN 43772 as well as ASME B40.9-2001 with extension European or American types	7MC7500-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Extension X European type: X=65 (M=80 mm) (3.15 inch) adjustable European type: X=139 mm (5.47 inch) (M=155 mm (6.10 inch)) adjustable (DIN standard length for L=110) European type: X=149 mm (5.87 inch) (M=165 mm (6.50 inch)) adjustable European type: NIP, =150 mm (5.91 inch) not adjustable (NPT $\frac{1}{2}$ "") European type: X=150 mm (5.91 inch) NUN adjustable (NPT $\frac{1}{2}$ "") American type: X=74 mm (2.91 inch) integrated sensor spring, NIP, not adjustable (NPT $\frac{1}{2}$ "") American type: X=150 mm (5.91 inch) integrated sensor spring NUN adjustable (NPT $\frac{1}{2}$ "")		
Model existing thermowells	1			1	
Thread type G $\frac{1}{2}$ " (½" BSPF) (not for American type) NPT $\frac{1}{2}$ " M14x1.5 (not for American type) M18x1.5 (not for American type)	C J T U			2	
Insertion length U free length, standard lengths 110 mm (4.33 inch) 140 mm (5.51 inch) 200 mm (7.87 inch) 260 mm (10.24 inch) 410 mm (16.14 inch)	B 1 B 2 C 1 C 2 E 1			3	
Insertion U free length, customer-specific enter customer specific length with Y44, see page 2/161 Order Codes 10 ... 100 mm (0.39 ... 3.94 inch) Initial: 100 mm (3.94 inch) 101 ... 200 mm (3.98 ... 7.87 inch) Initial: 200 mm (7.87 inch) 201 ... 300 mm (7.91 ... 11.81 inch) Initial: 300 mm (11.81 inch) 301 ... 400 mm (11.85 ... 15.75 inch) Initial: 400 mm (15.75 inch) 401 ... 500 mm (15.79 ... 19.68 inch) Initial: 500 mm (19.68 inch) 501 ... 600 mm (19.72 ... 23.62 inch) Initial: 600 mm (23.62 inch) 601 ... 800 mm (23.66 ... 31.50 inch) Initial: 800 mm (31.50 inch) 801 ... 1 000 mm (31.54 ... 39.37 inch) Initial: 1 000 mm (39.37 inch) 1 001 ... 1 250 mm (39.41 ... 49.21 inch) Initial: 1 250 mm (49.21 inch) 1 251 ... 1 500 mm (49.25 ... 59.05 inch) Initial: 1 500 mm (59.05 inch)	A 0 B 0 C 0 D 0 E 0 F 0 G 0 H 0 J 0 K 0			4	
Measurement tip diameter 6 mm (0.24 inch) 8 mm (0.31 inch) (with sleeve) 10 mm (0.39 inch) (with sleeve)	6 8 0			5	
			Extension X, customer-specific enter customer specific length with Y45, see page 2/161 Order Codes 55 ... 150 mm (2.17 ... 5.91 inch) Standard: 150 mm (5.91 inch) 151 ... 300 mm (5.95 ... 11.81 inch) Standard: 300 mm (11.81 inch) 301 ... 450 mm (11.85 ... 17.72 inch) Standard: 450 mm (17.72 inch)		
			Model European type (M24 adjustable)	6	
				8	
				9	N 1
				9	N 2
				9	N 3
					D

Additional configurations on page after next page!

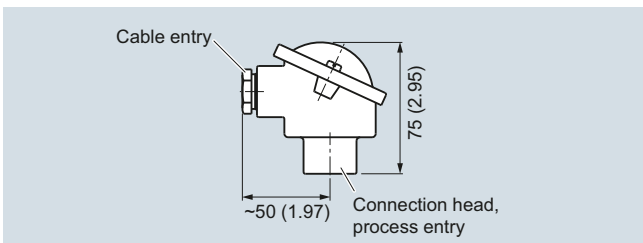
You find ordering examples on page 2/109!

Temperature Measurement

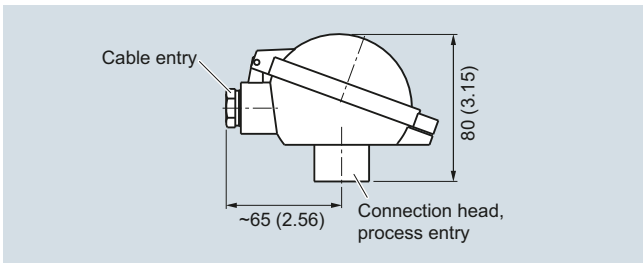
SITRANS TS500

For the installation of existing protective tubes

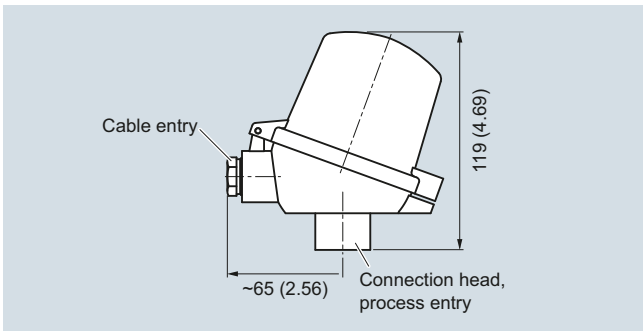
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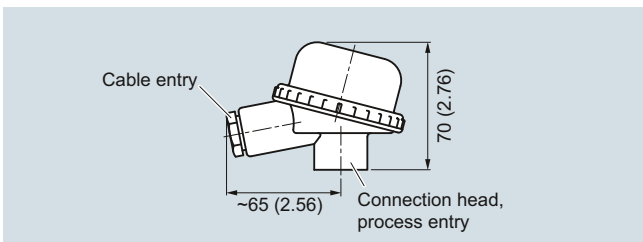
Connection head, aluminum, Type BA0, dimensions in mm (inch)



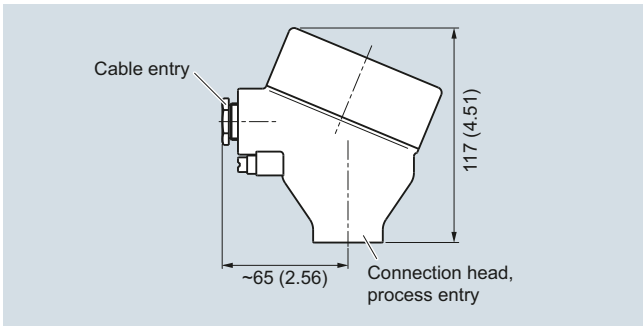
Connection head, aluminum, Type BB0, dimensions in mm (inch)



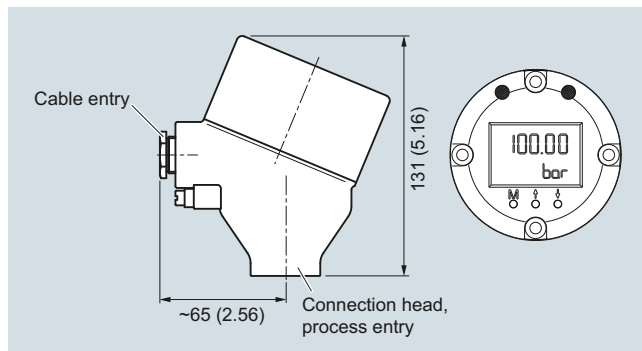
Connection head, aluminum, Type BC0, plastic, type BP0, dimensions in mm (inch)



Connection head, plastic, Type BM0, dimensions in mm (inch)



Connection head, aluminum, Type AG0, stainless steel, Type AU0, dimensions in mm (inch)



Connection head with 4-20 mA display, aluminum, Type AH0, stainless steel, Type AV0, dimensions in mm (inch)

Selection and Ordering data	Article No.	Ord. Code	Selection and Ordering data	Order code
SITRANS TS500 Temperature sensors for installation in existing thermowells, suitable for thermowells as per DIN 43772 as well as ASME B40.9-2001 with extension European or American types	7MC7500-		Options Add "-Z" to Article No. and add options, separate extensions with "+".	
Head Aluminum head, BA0, flange cover, Standard Aluminum head, BB0, low hinged cover, screw connection Aluminum head, BC0, high hinged cover, screw connection Aluminum head, AG0, screw cover, suitable for Ex d Aluminum head, AH0, screw cover, suitable for Ex d, display Plastic head, BM0, screw cover Plastic head, BPOhigh hinged cover, screw connection Stainless steel head, AU0, screw cover, Ex d Stainless steel head, AV0, screw cover, Ex d, display		A B C G H M P U V	Built-in head transmitter Measuring range to be set must be specified with plain text data "Y01". SITRANS TH100, 4 ... 20 mA, Pt100 SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100 SITRANS TH200, 4 ... 20 mA, Universal SITRANS TH200 Ex i (ATEX), 4 ... 20 mA, Universal SITRANS TH300, HART, Universal SITRANS TH300 Ex i (ATEX), HART, Universal SITRANS TH400 PA, Universal SITRANS TH400 PA Ex i, Universal SITRANS TH400 FF, Universal SITRANS TH400 FF Ex i, Universal	T10 T11 T20 T21 T30 T31 T40 T41 T45 T46
Sensor Please note: The accuracy class range can be lower than the measuring range. For more information, see page 2/88 Pt100, Basis, -50 ... +400 °C (-58 ... +752 °F) Pt100, vibration resistant, -50 ... +400 °C (-58 ... +752 °F) Pt100, expanded range, -196 ... +600 °C (-321 ... +1112 °F) Thermocouple Type J, only class 2, -40 ... +750 °C (-40 ... +1 382 °F) Thermocouple Type K, -40 ... +1 000 °C (-40 ... +1 832 °F) Thermocouple Type N, -40 ... +1 000 °C (-40 ... +1 832 °F)		A B C J K N	Explosion protection Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter) Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter) Non sparking "n"	E01 E03 E04
Sensor number/Accuracy Single, basic accuracy (Class 2/Class B) Single, increased accuracy (Class 1/Class A) Single, highest accuracy (Class AA) Double, basic accuracy (Class 2/Class B) Double, increased accuracy (Class 1/Class A) Double, highest accuracy (Class AA)		1 2 3 5 6 7	Certificates and approvals EN10204-3.1 Factory certificate: visual, measurement and functional inspection EN 10204-2.1: Declaration of compliance with the order	C34 C35
Selection and Ordering data		Order code	Designation, calibration Stainless steel TAG plate , enter lettering in plain text Plant calibration per 1 point, enter temperature in plain text	Y15 Y33
Further designs Add "-Z" to Article No. and specify Order Code.			Transmitter options Transmitter, enter complete setting in plain text (Y01:+/-NNNN ... +/-NNNN C,F) Enter measuring point (max. 8 characters) in plain text Transmitter, enter measuring point description (max. 16 characters) in plain text Transmitter, enter measuring point text (max. 32 characters) in plain text Transmitter, enter bus address in plain text Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA) Transmitter with a SIL 2 conformity Transmitter with a SIL 2/3 conformity Transmitter test protocol (5 points)	Y01 Y17 Y23 Y24 Y25 U36 C20 C23 C11
Insertion length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y44		Further options Connection form, flying leads (for the direct transmitter assembly, delivery without screws and springs) M12 plug (in combination with 1x Pt100 and/or transmitter , Non-Ex) Harting plug Han 7 D (Non Ex, without mating connector)	G01 G12 G13
Extension length customer-specific Select range, enter desired length in plain text (No entry = standard length)	Y45		Connection head with 1/2" NPT thread without cable gland, for AU0 and AH0 only IP66 with outer earth screw for heads AG0, AH0, AU0 and AV0 with inner earth screw for heads BC0, AG0, AH0, AU0 and AV0	G20 A02 A03

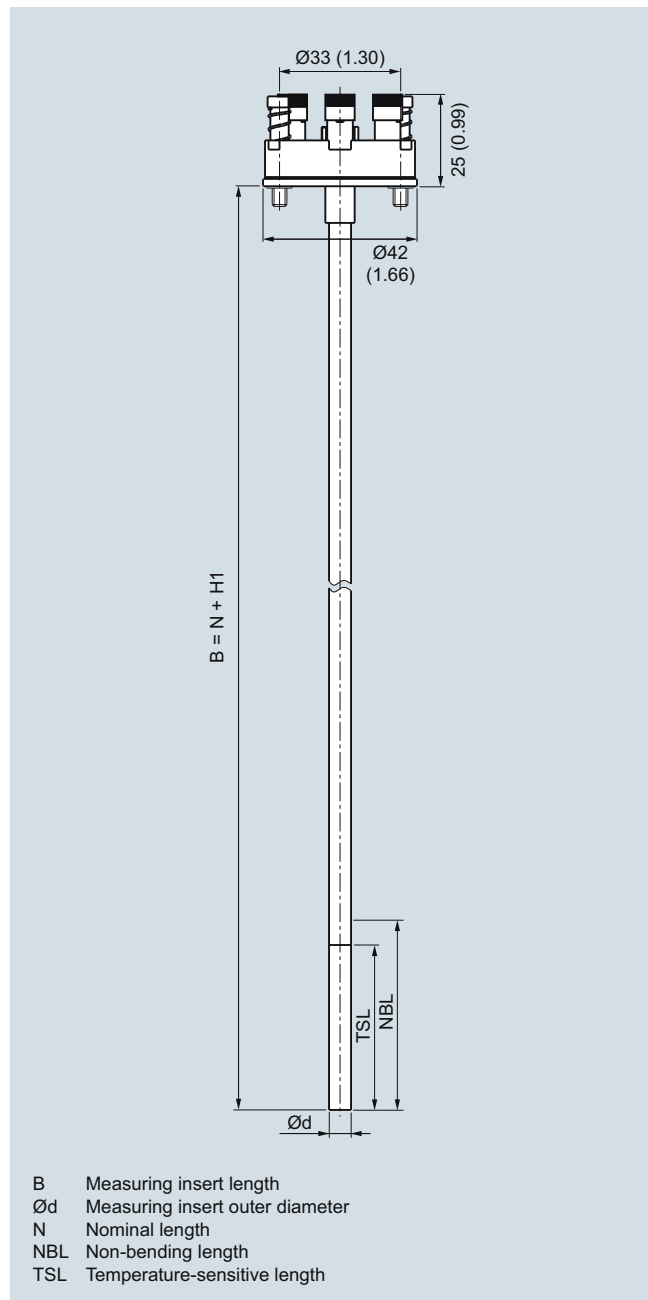
You find ordering examples on page 2/109!

Temperature Measurement

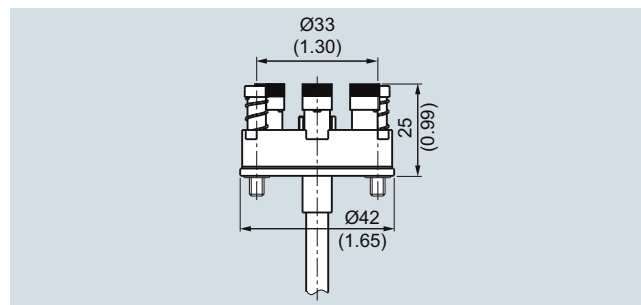
SITRANS TSinsert

Measuring inserts for retrofits and upgrades European and American type

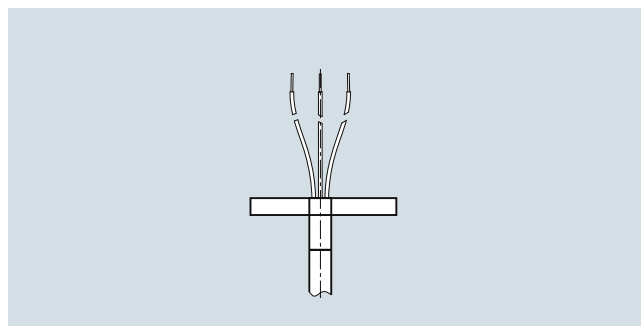
Dimensional drawings



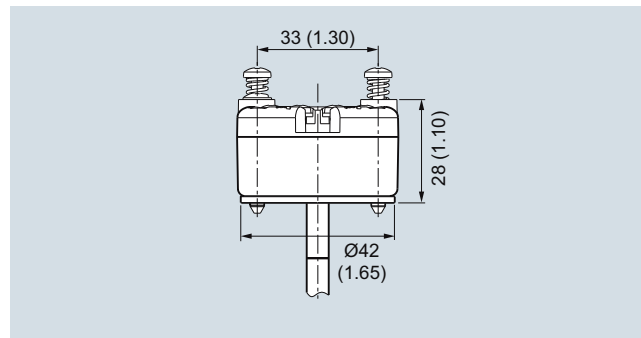
SITRANS TSinsert measuring inserts for temperature sensors, replaceable, mineral-insulated design
 European type (DIN ceramic base), spring load approx. 8 mm (0.31 inch)
 Cold End types: see drawings on right side, dimensions in mm (inch)



Cold End type, ceramic base, dimensions in mm (inch)



Cold End type, free wire ends, dimensions in mm (inch)



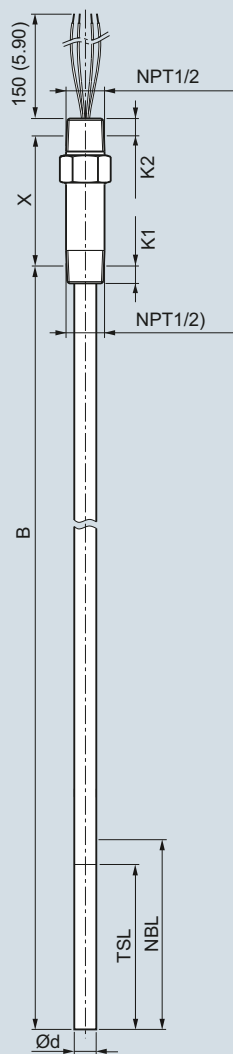
Cold End type, built-on transmitter, dimensions in mm (inch)

Temperature Measurement

SITRANS TSinsert

Measuring inserts for retrofits and upgrades European and American type

2



- B Measuring insert length
- Ød Measuring insert outer diameter
- K1 Screw depth
- K2 Screw depth
- N Nominal length
- NBL Non-bending length
- TSL Temperature-sensitive length
- X Extension

SITRANS TSinsert, measuring inserts for temperature sensors, replaceable, mineral-insulated design
 American type, spring load approx. 21 mm (0.83 inch)

Measuring inserts for retrofits and upgrades European and American type

Selection and Ordering data	Order code
Further designs	
Add "-Z" to Article No. and specify Order Code.	
Measuring insert length B	Y44
Select range, enter desired length in plain text (No entry = standard length)	
Options	
Add "-Z" to Article No. and add options, separate extensions with "+".	
Built-in head transmitter	
Measuring range to be set must be specified with plain text data "Y01".	
SITRANS TH100, 4 ... 20 mA, Pt100	T10
SITRANS TH100 Ex i (ATEX), 4 ... 20 mA, Pt100	T11
SITRANS TH200, 4 ... 20 mA, Universal	T20
SITRANS TH200 Ex i(ATEX), 4 ... 20 mA, Universal	T21
SITRANS TH300, HART, Universal	T30
SITRANS TH300 Ex i (ATEX), HART, Universal	T31
SITRANS TH400 PA, Universal	T40
SITRANS TH400 PA Ex i, Universal	T41
SITRANS TH400 FF, Universal	T45
SITRANS TH400 FF Ex i, Universal	T46
Explosion protection	
Intrinsic safety "ia", "ic" (please select Ex i version of the optional transmitter)	E01
Flameproof enclosure "d"; dust protection through housing "t" only with connection heads code AG0, AH0, AU0, AV0, without cable gland (please select non-Ex version of the optional transmitter)	E03
for SITRANS TS500 with protection type Ex n	E04
Designation, calibration	
Stainless steel TAG plate, enter lettering in plain text	Y15
Plant calibration per 1 point, enter temperature in plain text	Y33
Transmitter options	
Transmitter, enter complete setting in plain text (Y01: +/-NNNN ... +/-NNNN C,F)	Y01
Enter measuring point (max. 8 characters) in plain text	Y17
Transmitter, enter measuring point description (max. 16 characters) in plain text	Y23
Transmitter, enter measuring point text (max. 32 characters) in plain text	Y24
Transmitter, enter bus address in plain text	Y25
Transmitter, fail-safe value 3.6 mA (instead of 22.8 mA)	U36
Transmitter with a SIL 2 conformity	C20
Transmitter with a SIL 2/3 conformity	C23
Transmitter test protocol (5 points)	C11

You find ordering examples on page 2/109!

Temperature Measurement

Resistance thermometers

Temperature transmitters for mounting in the connection head

Overview



The following temperature transmitters are available for mounting in the connection head:

SITRANS TH100

Programmable two-wire temperature transmitter (4 to 20 mA), without electrical isolation, only for Pt100 resistance thermometers.

SITRANS TH200

Programmable two-wire temperature transmitter (4 to 20 mA), electrical isolation for resistance thermometers and thermocouple elements.

SITRANS TH300

Two-wire temperature transmitter with HART communication (4 to 20 mA), electrical isolation for resistance thermometers and thermocouple elements.

SITRANS TH400

Temperature transmitter with PROFIBUS PA or FOUNDATION Fieldbus connection, electrical isolation for resistance thermometers and thermocouple elements.

Note:

- SITRANS TH100/TH200/TH300/TH400 can be fitted instead of the terminal block or in the high hinged cover. Additional fitting only possible in high hinged cover.
- If using intrinsically-safe temperature sensors any installed temperature transmitters must also be intrinsically-safe.

Selection and Ordering Data

Detailed information on the transmitters can be found for the respective products under "Transmitters for temperature".

Transmitter to be fitted	Order code
To order the sensor with a built-in temperature transmitter, add "-Z" to the Article No. of the sensor, and supplement by the following Order code:	
SITRANS TH100, only for Pt100	
• Without Ex	T10
• EEx ia IIC and EEx n for zone 2	T11
• FM	T13
SITRANS TH200	
• Without Ex	T20
• EEx ia IIC and EEx n for zone 2	T21
• FM (IS, I, NI)	T23
SITRANS TH300	
• Without Ex	T30
• EEx ia IIC und EEx n for zone 2	T31
• FM (IS, I, NI)	T33
SITRANS TH400 PA	
• Without Ex	T40
• EEx ia	T41
SITRANS TH400 FF	
• Without Ex	T45
• EEx ia	T46
• Customer-specific setting of the built-in transmitter (specify settings in plain text)	Y11

Questionnaire for temperature sensors (resistance thermometers and thermocouples)

General information

Customer:

Address:

Contact partner:

Purchasing dept.: Tel.:

Sales dept.: Tel.:

Process dept.: Tel.:

Inquiry:

Quotation:

Place and date:

Operating conditions

1. Application:
(e.g. exhaust gas measurement)
2. Location:
(e.g. pipe bend, tank)
3. Mounting position:
(e.g. vertical, 45° against flow)
4. Temperature (measuring point):
Operating temperature:
Temperature range:
5. Medium:
6. Pressure:
Nominal pressure:
Operating pressure:
7. Flow:
8. Vibrations:
9. Miscellaneous:
(e.g. vessel or pipe materials, PTFE lining)

Ambient conditions

(e.g. seawater atmosphere, chemical plant)

Definition:

.....

.....

Special information

1. Mounting of temperature transmitter in connection head:
.....
.....
2. Packaging regulations:

Miscellaneous

Please additionally provide the following: rough sketch, installation diagram, section of drawing, photo

Sensor design

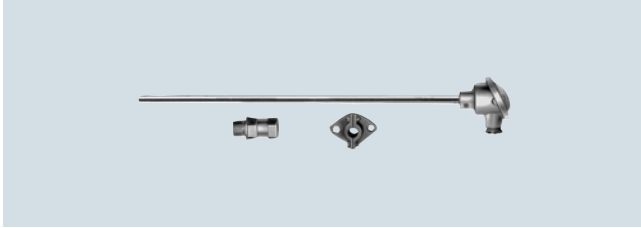
1. Measuring element.....
(type and standard) (e.g. Pt100 or TC type K)
 - 1.1. Tolerance:.....
 - 1.2. Design:
(e.g. Pt100 or 2, 3 or 4-wire system)
 - 1.3. Degree of protection/type of protection:
2. Protective fitting:.....
 - 2.1. Protective tube:
(dimensions/material)
 - 2.2. Mounting:
(dimensions/material)
 - 2.3. Neck tube:
(dimensions/material)
 - 2.4. Mounting length/nominal length:
3. Material certificates:
4. Connection:
- 4.1. Connection head/box:
- 4.2. Cable:
(dimensions/insulation/standard)
- 4.3. Other:
5. Tests:
6. Accessories:.....
7. Supplementary requirements:

Temperature Measurement

Resistance thermometers

Flue gas resistance thermometers with connection head

Overview



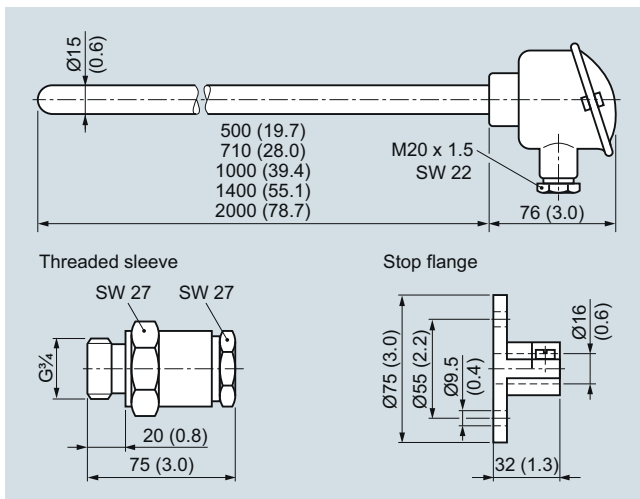
The flue gas resistance thermometer with connection head is suitable for the temperature range from -50 to $+600$ °C (-58 to $+1112$ °F) and can also be supplied with a built-in temperature transmitter.

Please order mounting flange or threaded sleeve separately.

Technical specifications

Design	According to DIN 43764: Thermometer without mount
Protective tube	
• Form	1, DIN 43772; cylindrical, 15 mm diameter (0.59 inch), wall thickness 3 mm (0.12 inch), seamless
• Material	St 35.8, mat. No. 1.0305, enamelled
• Loading capacity	1 bar (14.5 psi) above atmospheric, to DIN 43772
Measuring insert	Replaceable, with measuring insert tube (8 mm diameter (0.31 inch)) made of stainless steel; terminal block with clamping springs

Dimensional drawings



Flue gas resistance thermometer with connection head, dimensions in mm (inches)

Selection and Ordering data

Article No.

Flue gas resistance thermometer

Measuring resistor (winding) embedded in ceramic
1 Pt100 measuring resistor, three-wire circuit

Mounting length/ mm (inch):	Weight/ kg (lb):	
• 500 (19.7)	0.9 (1.98)	7MC1000 - 1BA2
• 710 (28.0)	1.1 (2.43)	7MC1000 - 2BA2
• 1000 (39.4)	1.5 (3.31)	7MC1000 - 3BA2
• 1400 (55.1)	1.9 (4.19)	7MC1000 - 4BA2
• 2000 (78.7)	2.7 (5.95)	7MC1000 - 5BA2

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Connection head, form B,

made of cast light alloy, with 1 cable inlet and

- Screw cover **1**
- Standard hinged cover **4**
- High hinged cover **6**

Further designs

Please add **"-Z"** to Article No. and specify Order code(s) and plain text.

Special version, specify in plain text **Y98**

Process number for special version **Y99**

TAG plate made of stainless steel specify TAG No. in plain text **Y15**

Calibration carried out at one point, specify desired temperature in plain text (order equivalent number of times for several calibration points).
If optional head transmitters are integrated, please note that all calibration points are located in the set measuring range. If the points are located outside the standard measuring range, a Y11 addition is always required. **Y33**

Accessories

Mounting flange

Adjustable, to DIN 43734;
Material: GTW 35, mat. No. 0.8035, for protective tube diameter 15 mm (0.59 inch), 0.3 kg (0.66 lb)

Gas-tight threaded sleeve

Material: 9 SMnPb 28
Material No. 1.0718, for protective tube diameter 15 mm (0.59 inch), 0.4 kg (0.88 lb)

- G $\frac{3}{4}$ internal thread with gasket
- G $\frac{1}{2}$ internal thread with gasket

To order a temperature transmitter installed in the connection head and transmitters for SIL applications, see "Temperature transmitters for mounting in the connection head" (page 2/166).

Individual parts: Measuring inserts, see "Accessories" on page 2/170

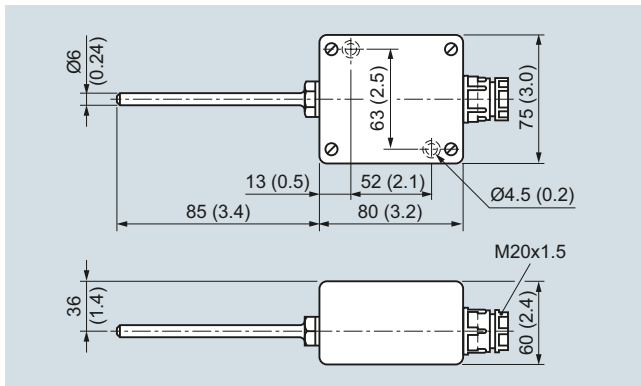
Overview

The resistance thermometer for damp rooms is suitable for a temperature range from -30 to +60 °C (-22 to +140 °F).

Technical specifications

Protective tube	Made of stainless steel
Connection head	Made of cast light alloy, with cable bushing; made of plastic on request
Measuring insert	1 or 2 Pt measuring resistors to DIN EN 60751, connection in three-wire or two-wire system, class B
Degree of protection	IP65 acc. to DIN EN 60529

Dimensional drawings



Resistance thermometer for damp rooms, dimensions in mm (inches)

Selection and Ordering data

Article No.

Resistance thermometer for damp rooms

stainless steel protective tube

- with one Pt100 measuring resistor 0.1 kg (0.22 kg) ▶ **7MC1027-1AA**
- with two Pt100 measuring resistors 0.1 kg (0.22 kg) **7MC1027-1AB**

Further designs

Please add **"-Z"** to Article No. and specify Order code(s) and plain text.

Special version, specify in plain text

Y98

Process number for special version

Y99

TAG plate made of stainless steel specify TAG No. in plain text

Y15

Calibration carried out at one point, specify desired temperature in plain text (order equivalent number of times for several calibration points).

Y33

If optional head transmitters are integrated, please note that all calibration points are located in the set measuring range. If the points are located outside the standard measuring range, a Y11 addition is always required.

▶ Available ex stock

To order a temperature transmitter installed in the connection head and transmitters for SIL applications, see "Temperature transmitters for mounting in the connection head" (page 2/166).

Note:

Additional fitting of head mounted transmitter of SITRANS TH series is possible.

Temperature Measurement

Resistance thermometers

Accessories – Welding-type protective tubes, neck tubes and connection heads

Welding-type protective tube

Welding-type protective tube for high-pressure resistance thermometers to DIN 43 767, without neck tube, without connection head

- Tapered shank with cylindrical welding stubs
- For measuring insert tube with 6 mm (0.24 inch)
- OD female thread M18 x 1.5 (including steel screw plug)

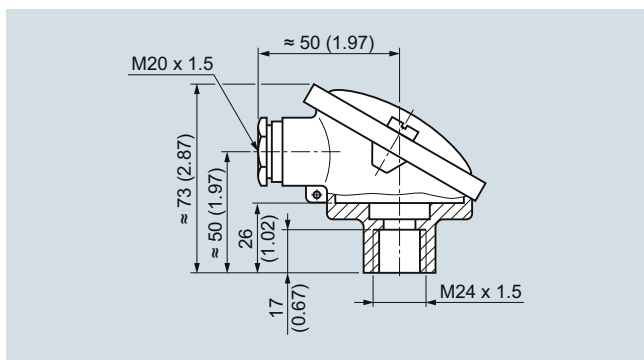
Neck tube

Neck tube for high-pressure screw-in resistance thermometer

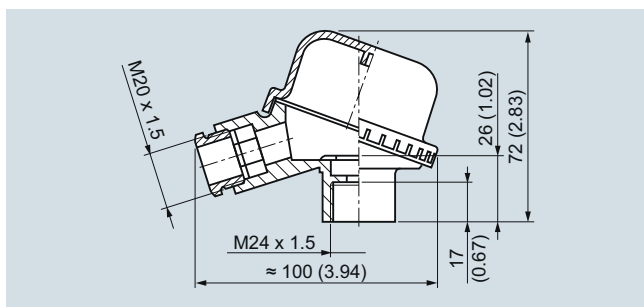
- Made of stainless steel, mat. No. 1.4571
- With threads at both ends
- For measuring insert tube with 6 mm (0.24 inch) OD

Dimensional drawings

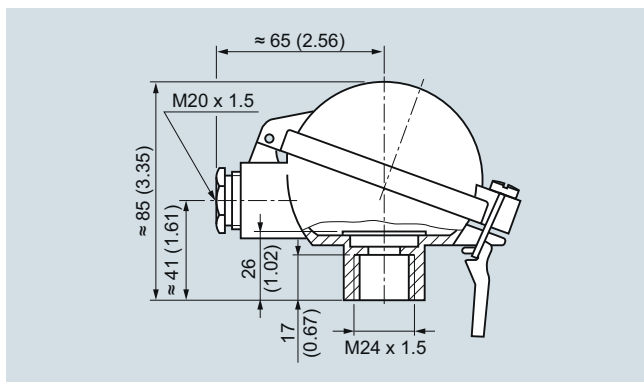
Connection heads for low and high-pressure resistance thermometers, flue gas and flange-type resistance thermometers



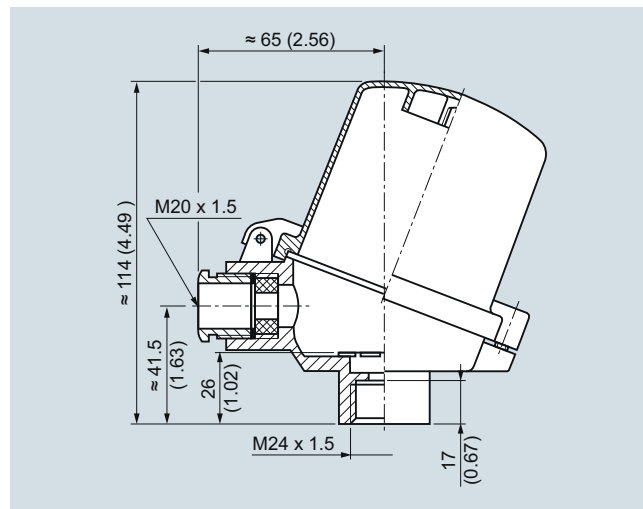
Connection head, form B, degree of protection IP54, made of cast light alloy, with screw cover, dimensions in mm (inches)



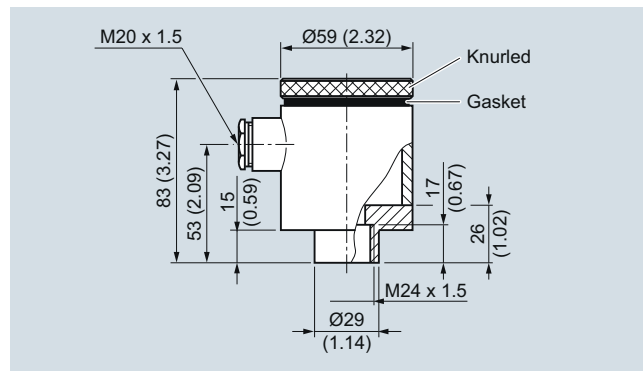
Connection head, form B, degree of protection IP54, made of plastic, with screw cover, dimensions in mm (inches)



Connection head, form B, degree of protection IP65, made of cast light alloy, with standard hinged cover, dimensions in mm (inches)



Connection head, form B, degree of protection IP65, made of cast light alloy, with high hinged cover, dimensions in mm (inches)



Connection head, form B-VA, degree of protection IP65, made of stainless steel, with screw cover, dimensions in mm (inches)

Selection and Ordering data	Article No.															
<p>Welding protective tube for high-pressure resistance thermometers according to DIN 43767, without neck tube, without connection head</p> <p>tapered shank with cylindrical welding stub, for measuring insert tube with 6 mm (0.24 inch) OD; female thread M18 x 1.5 (including steel screw plug)</p>																
<p>Up to 540 °C (1004 °F)</p> <p>Protective tube to DIN 43772, form 4 made of 13 CrMo 44, mat. No. 1.7335</p> <table border="1"> <thead> <tr> <th>Cone length C mm (inch)</th> <th>Protective tube length L mm (inch)</th> <th>Weight mm (inch)</th> </tr> </thead> <tbody> <tr> <td>• 65 (2.56)</td> <td>140 (5.51)</td> <td>0.3 (0.66)</td> </tr> <tr> <td>• 65 (2.56)</td> <td>200 (7.87)</td> <td>0.5 (1.1)</td> </tr> <tr> <td>• 125 (4.92)</td> <td>200 (7.87)</td> <td>0.5 (1.1)</td> </tr> <tr> <td>• 125 (4.92)</td> <td>260 (10.24)</td> <td>0.6 (1.32)</td> </tr> </tbody> </table>	Cone length C mm (inch)	Protective tube length L mm (inch)	Weight mm (inch)	• 65 (2.56)	140 (5.51)	0.3 (0.66)	• 65 (2.56)	200 (7.87)	0.5 (1.1)	• 125 (4.92)	200 (7.87)	0.5 (1.1)	• 125 (4.92)	260 (10.24)	0.6 (1.32)	<p>7MC1905-1GA 7MC1905-2GA 7MC1905-3GA 7MC1905-4GA</p>
Cone length C mm (inch)	Protective tube length L mm (inch)	Weight mm (inch)														
• 65 (2.56)	140 (5.51)	0.3 (0.66)														
• 65 (2.56)	200 (7.87)	0.5 (1.1)														
• 125 (4.92)	200 (7.87)	0.5 (1.1)														
• 125 (4.92)	260 (10.24)	0.6 (1.32)														
<p>Up to 550 °C (1022 °F)</p> <p>Protective tube to DIN 43772, form 4 made of 6 CrNiMoTi 17122, mat. No. 1.4571</p> <table border="1"> <thead> <tr> <th>Cone length C mm (inch)</th> <th>Protective tube length L mm (inch)</th> <th>Weight kg (lb)</th> </tr> </thead> <tbody> <tr> <td>• 65 (2.56)</td> <td>140 (5.51)</td> <td>0.3 (0.66)</td> </tr> <tr> <td>• 65 (2.56)</td> <td>200 (7.87)</td> <td>0.5 (1.1)</td> </tr> <tr> <td>• 125 (4.92)</td> <td>200 (7.87)</td> <td>0.5 (1.1)</td> </tr> <tr> <td>• 125 (4.92)</td> <td>260 (10.24)</td> <td>0.6 (1.32)</td> </tr> </tbody> </table>	Cone length C mm (inch)	Protective tube length L mm (inch)	Weight kg (lb)	• 65 (2.56)	140 (5.51)	0.3 (0.66)	• 65 (2.56)	200 (7.87)	0.5 (1.1)	• 125 (4.92)	200 (7.87)	0.5 (1.1)	• 125 (4.92)	260 (10.24)	0.6 (1.32)	<p>7MC1905-1DA 7MC1905-2DA 7MC1905-3DA 7MC1905-4DA</p>
Cone length C mm (inch)	Protective tube length L mm (inch)	Weight kg (lb)														
• 65 (2.56)	140 (5.51)	0.3 (0.66)														
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• 125 (4.92)	200 (7.87)	0.5 (1.1)														
• 125 (4.92)	260 (10.24)	0.6 (1.32)														

Selection and Ordering data	Article No.																								
<p>Neck tube for high-pressure screw-in resistance thermometer</p> <p>made of stainless steel, mat. No. 1.4571, with thread at both ends, for measuring insert tube with 6 mm (0.24 inch) OD</p>																									
<table border="1"> <thead> <tr> <th>Neck tube length mm (inch)</th> <th>Total length of the resistance thermometer, without connection head mm (inch)</th> <th>Protective tube length mm (inch)</th> <th>Weight kg (lb)</th> </tr> </thead> <tbody> <tr> <td>• 135 (5.31)</td> <td>395 (15.55)</td> <td>260 (10.24)</td> <td>0.14 (0.31)</td> </tr> <tr> <td>• 165 (6.50)</td> <td>305/365 (12.01/14.37)</td> <td>140/200 (5.51/7.87)</td> <td>0.15 (0.33)</td> </tr> <tr> <td>• 195 (7.68)</td> <td>395 (15.55)</td> <td>200 (7.87)</td> <td>0.18 (0.40)</td> </tr> <tr> <td>• 225 (8.86)</td> <td>365 (14.37)</td> <td>140 (5.51)</td> <td>0.20 (0.44)</td> </tr> <tr> <td>• 255 (10.04)</td> <td>395 (15.55)</td> <td>140 (5.51)</td> <td>0.22 (0.49)</td> </tr> </tbody> </table>	Neck tube length mm (inch)	Total length of the resistance thermometer, without connection head mm (inch)	Protective tube length mm (inch)	Weight kg (lb)	• 135 (5.31)	395 (15.55)	260 (10.24)	0.14 (0.31)	• 165 (6.50)	305/365 (12.01/14.37)	140/200 (5.51/7.87)	0.15 (0.33)	• 195 (7.68)	395 (15.55)	200 (7.87)	0.18 (0.40)	• 225 (8.86)	365 (14.37)	140 (5.51)	0.20 (0.44)	• 255 (10.04)	395 (15.55)	140 (5.51)	0.22 (0.49)	<p>7MC1906-1AA 7MC1906-2AA 7MC1906-3AA 7MC1906-4AA 7MC1906-5AA</p>
Neck tube length mm (inch)	Total length of the resistance thermometer, without connection head mm (inch)	Protective tube length mm (inch)	Weight kg (lb)																						
• 135 (5.31)	395 (15.55)	260 (10.24)	0.14 (0.31)																						
• 165 (6.50)	305/365 (12.01/14.37)	140/200 (5.51/7.87)	0.15 (0.33)																						
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• 225 (8.86)	365 (14.37)	140 (5.51)	0.20 (0.44)																						
• 255 (10.04)	395 (15.55)	140 (5.51)	0.22 (0.49)																						

Selection and Ordering data	Article No.
<p>Connection heads for low-pressure, high-pressure, flue gas and flange-type resistance thermometers</p>	
<p>Connection head, form B, degree of protection IP54</p> <p>Made of cast light alloy, with screw cover and with 1 cable bushing, weight: 0.14 kg (0.31 lb)</p> <p>Made of plastic, with screw cover and with 1 cable bushing, weight: 0.08 kg (0.18 lb)</p>	<p>7MC1907-1BA</p> <p>7MC1907-1BK</p>
<p>Connection head, form B, degree of protection IP65</p> <p>Weight: 0.3 kg (0.66 lb)</p> <p>Made of cast light alloy, with standard hinged cover and with 1 cable bushing</p> <p>Made of cast light alloy, with high hinged cover and with 1 cable bushing</p>	<p>7MC1907-1BF</p> <p>7MC1907-1BL</p>
<p>Connection head, form B-VA, degree of protection IP65</p> <p>Made of stainless steel, with screw cover and with 1 cable bushing, weight: 0.65 kg (1.43 lb)</p>	<p>7MC1907-1BV</p>
<p>Accessories</p> <p>for connection head, form B, degree of protection IP65</p> <p>Quick-release clamp (degree of protection of connection head reduced to IP54)</p> <p>Weight: 0.02 kg (0.04 lb)</p>	<p>7MC1907-1BS</p>
<p>Connection heads with a drilled hole of 15.5 mm diameter (0.61 inch) instead of the female thread M24 x 1.5 on request.</p>	

Temperature Measurement

Thermocouples

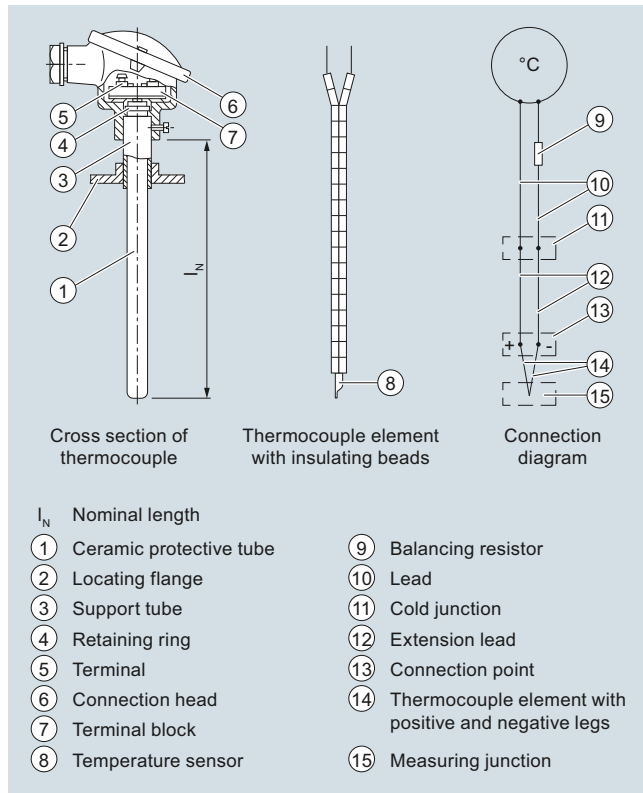
Technical description

Design

A thermocouple comprises

- The thermocouple element (sensor) and
- The mounting and connection parts required in each case.

The thermocouple element is formed by two conductors of dissimilar metals or metal alloys which are soldered or welded together at one end, the measuring junction:



Thermocouple element

Function

Measuring principle of the thermocouple element

If the measuring junction is exposed to a temperature different from that at the free ends of the thermocouple, a voltage (the thermoelectric voltage, Seebeck effect) is produced at these free ends. The magnitude of the thermoelectric voltage depends on the difference in temperature between the measuring junction and the free ends, and on the combination of materials in the thermocouple. Since a thermocouple always measures a temperature difference, the free ends of the thermocouple must be connected to a reference junction (cold junction) and held constant at a known temperature.

Calibration data for thermoelectric voltages and permissible deviations

The calibration data and the permissible deviations for commonly used thermocouples are defined (see Technical Data, Table "Calibration data for thermoelectric voltages and error limits").

The thermocouples Cu-CuNi and Fe-CuNi to DIN 43710 are used for replacement purposes. Thermocouples of class 2 are supplied as standard. For more accurate measurements, thermocouples are available with half the DIN tolerance or with a test certificate. The tolerances only apply to the condition upon delivery.

During operation at high temperatures, the tolerances of the thermocouples may change due to absorption of foreign matter, oxidation or evaporation of alloy components.

Mode of operation

The thermocouples are extended from the connection point to a point whose temperature is as constant as possible (the cold junction) by means of extension leads.

The extension leads have the same color code as the associated thermocouple elements; the positive pole is marked in red. Correct polarity must be ensured since otherwise large errors will occur. Up to 200 °C, the same calibration data and tolerances apply to the extension leads as to the corresponding thermocouples.

The influence of temperature changes at the cold junction can be balanced by means of a compensating circuit, e.g. a compensating box. The reference temperature is 0 (32 °F) or 20 °C (68 °F).

It is also possible to keep the cold junctions at a constant temperature of 50, 60 or 70 °C (122, 140 or 158 °F) using a thermostat (for several measuring junctions).

The connections from the cold junction to the measuring or process instrument are made using copper leads. With energy-consuming instruments such as indicators or multipoint recorders, the complete measuring circuit (thermocouple, extension lead and copper lead) must be balanced in the operating condition using a resistor. SITRANS T transmitters and process recorders for connection to thermocouple elements have a built-in compensating circuit for balancing the effect of the ambient temperature on the cold junction. Lead balancing is not necessary in this case because of the high input impedance.

Protection fitting/protective tubes

The thermocouple can be protected against mechanical stress and chemical attack by a ceramic or metal protective tube which may be mounted using flanges, screwed glands or by welding into the pipeline or tank. The thermocouple element terminates in the connection head.

Installation examples with specification of the recommended thermocouples and protective tube materials are listed on pages "Technical Data" and "Installation Examples".

Owing to the different operating conditions, no guarantee can be given for protective fittings. The manufacturer is responsible for damages and measuring errors caused by wrong installation in compliance with the General Terms of Delivery if the instruments have been installed by the manufacturer and if the specifications for the operating conditions furnished by the customer were correct and sufficiently detailed.

Thermocouple elements are very compatible since it is almost always possible to adapt them in shape and size to the particular problem. The temperature-responsive part is almost point-shaped. Thermocouple elements are therefore particularly suitable for measuring rapidly changing temperatures.

Straight thermocouples to DIN 43733, with connection head

Overview

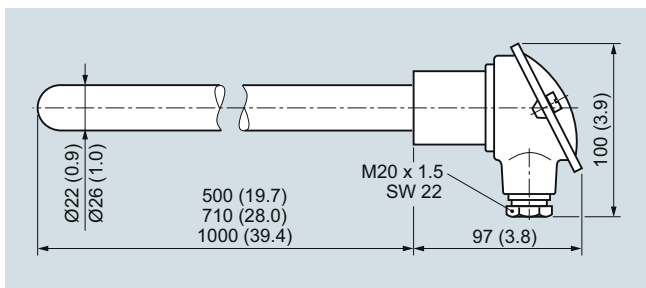


The straight thermocouple together with a metal protective tube is suitable for temperatures from 0 to 1250 °C (32 to 2282 °F) and can be supplied with a built-in temperature transmitter.

Technical specifications

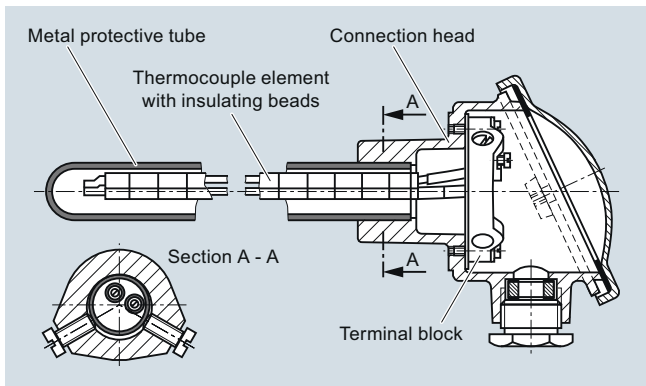
Thermocouples	Ni Cr/Ni type K
• Number	1 or 2
• Leg diameter	2 ... 3 mm (0.08 ... 0.12 inch)
• Insulation of legs	Insulating beads
Protective tube	Metal
Connection head	Form A, DIN 43729; made of cast light alloy, with one cable bushing

Dimensional drawings



Straight thermocouple, dimensions in mm (inches)

Design



Straight thermocouple with base-metal element Ni Cr/Ni with metal protective tube

Selection and Ordering data

Straight thermocouple with Ni Cr/Ni thermocouple (type K)
with metallic protective tube

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Nominal length

Enter customer specific length with Y44, see Order Codes below

300 ... 500 mm (11.81 ... 19.68 inch)
Initial: 500 mm (19.68 inch)

501 ... 710 mm (19.72 ... 27.95 inch)
Initial: 710 mm (27.95 inch)

711 ... 1000 mm (27.11 ... 39.37 inch)
Initial: 1 000 mm (39.37 inch)

1 001 ... 1 400 mm (39.41 ... 55.12 inch)
Initial: 1 400 mm (55.12 inch)

1 401 ... 2 000 mm (55.16 ... 78.74 inch)
Initial: 2 000 mm (78.74 inch)

Protective tube

to 1 000 °C (1 832 °F);
X 10 CrAl 24, material No. 1.4762
Ø 22 mm x 2 mm (0.87 inch x 0.079 inch)
Leg diameter 2 mm (0.08 inch)

to 1 100 °C; (2 012 °F)
X 18 CrN28, material No. 1.4749
Ø 26 x 4 mm (1.02 x 0.16 inch)
Leg diameter 3 mm (0.12 inch)

to 1 200 °C; (2 192 °F)
X 15 CrNi Si 24 19, material No. 1.4841
Ø 22 x 2 mm (0.87 x 0.079 inch)
Leg diameter 2 mm (0.08 inch)

to 1 250 °C; (2 282 °F)
CrAl 205 (Kantal AF), material No. 1.4767
Ø 22 x 2 mm (0.87 x 0.079 inch)
Leg diameter 3 mm (0.12 inch)

Number of thermocouples

1 thermocouple

2 thermocouples

Connection head, form A,

made of cast light alloy, with 1 cable inlet and
- screw cover
- high hinged cover

Article No.

7MC2000	-	0
1		
2		
3		
4		
5		
D		
E		
F		
H		
C		
D		
1		
6		

Selection and Ordering data

Straight thermocouple with Ni Cr/Ni thermocouple (type K)
for temperatures to 1250 °C (2282 °F);
with metallic protective tube

Further designs

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Special version, specify in plain text

Process number for special version

TAG plate made of stainless steel
specify TAG No. in plain text

Calibration carried out at one point, specify desired temperature in plain text (order equivalent number of times for several calibration points).

Insertion length customer-specific

Select range,
enter desired length in plain text
(No entry = standard length)

To order a temperature transmitter installed in the connection head, see "Temperature transmitters for installation in the connection head" (page 2/166).

Installation of a transmitter is only possible here in the versions with a high hinged cover (7MC2000-....6).

Order code

Y98
Y99
Y15
Y33
Y44

Temperature Measurement

Thermocouples

Straight thermocouples Individual parts and accessories

Selection and Ordering data	Article No.
Metallic protective tubes for straight thermocouple elements according to DIN 43733 X 10 CrAl 24, material No. 1.4762 Ø 22 mm x 2 mm (Ø 0.87 inch x 0.08 inch), 0.55 ... 1.10 kg (1.21 ... 2.42 lb), dished Nominal length Protective tube length in mm (inch): in mm (inch): • 500 (19.7) 520 (20.5) • 710 (28.0) 730 (28.7) • 1000 (39.4) 1020 (40.2)	7MC2900-1DA 7MC2900-2DA 7MC2900-3DA
X 10 CrAl 24, material No. 1.4749 Ø 26 mm x 4 mm (Ø 1.02 inch x 0.16 inch), 1.25 ... 2.20 kg (2.76 ... 4.85 lb), dished Nominal length Protective tube length in mm (inch): in mm (inch): • 500 (19.7) 520 (20.5) • 710 (28.0) 730 (28.7) • 1000 (39.4) 1020 (40.2)	7MC2900-1EC 7MC2900-2EC 7MC2900-3EC
X 15 CrNiSi 25 20, material No. 1.4841 Ø 22 mm x 2 mm (Ø 0.87 inch x 0.08 inch), 1.05 kg (2.31 lb), dished Nominal length Protective tube length in mm (inch): in mm (inch): • 1000 (39.4) 1020 (40.2)	7MC2900-3FA
CrAl 205 (Megapyr), material No. 1.4767 Ø 22 mm x 2 mm (Ø 0.87 inch x 0.05 inch), 0.55 ... 1.10 kg (1.21 ... 2.42 lb) Nominal length Protective tube length in mm (inch): in mm (inch): • 500 (19.7) 520 (20.5) • 710 (28.0) 730 (28.7) • 1000 (39.4) 1020 (40.2)	7MC2900-1HA 7MC2900-2HA 7MC2900-3HA

Selection and Ordering data	Article No.
Thermocouples elements for straight thermocouple according to DIN 43733 Base-metal thermocouple with insulating beads Wire diameter 3 mm (0.12 inch) Ni Cr/Ni, to 1000 °C (maximal 1300 °C), (to 1832 °F (max. 2372 °F)) 0.55 ... 2.10 kg (1.21 ... 4.63 lb) Nominal length <i>L</i> 1 in Thermocouple length <i>L</i> 2 in mm (inch): mm (inch): • 500 (19.7) 540 (21.3) • 710 (28.0) 750 (29.5) • 1000 (39.4) 1040 (40.9)	7MC2903-1CA 7MC2903-2CA 7MC2903-3CA

Connection heads

Connection head, form A (without terminal block and terminals) for protective tube diameter (bore = protective tube diameter +0.5 mm (0.02 inch))

Selection and Ordering data

Article No.

Connection head, form A, (without terminal block and terminals)

1 Cable inlet, degree of protection IP53, 0.35 kg (0.77 lb)

Cast light alloy

fastener, unscrewable

for protective tube diameter in mm (inch) (bore = protective tube diam. +0.5 mm) (0.02 inch):

- 22 (0.87)
- 26 (1.02)

7MC2905-1 AA
7MC2905-1 BA

Cast light alloy

high hinged cover

for protective tube diameter in mm (inch) (bore = protective tube diam. +0.5 mm) (0.02 inch):

- 22 (0.87)
- 26 (1.02)

7MC2905-4 AA
7MC2905-4 BA

Mounting accessories for connection heads

- Terminal block
- Terminal
- Set of gaskets
- Set of washers
- Mounting flange
- Threaded sleeve

Selection and Ordering data

Article No.

Mounting accessories

Terminal block without terminals

for base-metal thermocouples; 0.06 kg (0.13 lb)

7MC2998-1 AA

Terminal

for base-metal thermocouples; 0.01 kg (0.02 lb)

7MC2998-1 BA

Set of gaskets (100 off)

for the connection head cover; 0.01 kg (0.02 lb)

7MC2998-1 CA

Set of washers (100 off)

for the terminal block; 0.01 kg (0.02 lb)

7MC2998-1 CB

Mounting flange, adjustable; made of GTW

• for protective tube outer diameters 22 mm (0.87 inch); 0.35 kg (0.77 lb)

7MC2998-2 CB

• for protective tube outer diameters 26 mm (1.02 inch); 0.32 kg (0.71 lb)

7MC2998-2 CC

Threaded sleeve

Gas-tight up to 1 bar (14.5 psi), adjustable, material No. 1.0718, with gasket; 0.40 kg (0.88 lb)

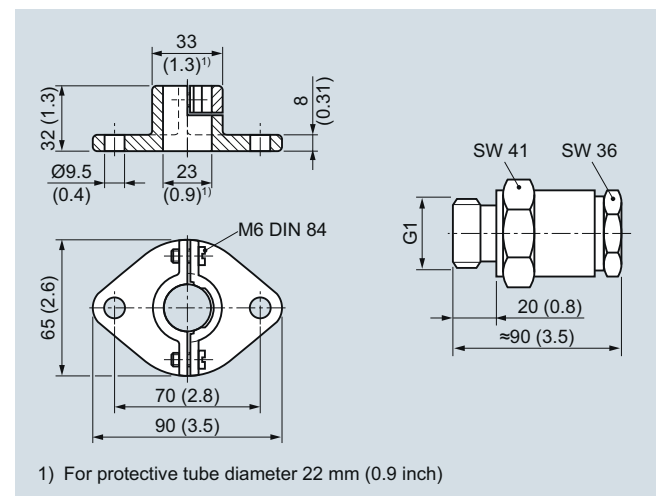
• for protective tube outer diameters 22 mm (0.87 inch), **G1**

7MC2998-2 DB

• for protective tube outer diameters 26 mm (1.02 inch), **G1**

7MC2998-2 DC

Dimensional drawings



Mounting flange to DIN 43734 (left) and threaded sleeve (right) for installing straight thermocouples, dimensions in mm (inches)

Temperature Measurement

Notes

2



3/2 Product overview

Introduction

- 3/11 Criteria for selection of flowmeter
- 3/12 Communication solutions

SITRANS F M (electromagnetic)

- 3/13 System information
- 3/31 SITRANS F M Vericator Transmitters
 - 3/33 - MAG 5000/6000
 - 3/45 - MAG 6000 I/6000 I Ex
- Flow sensors
 - 3/50 - MAG 1100 and MAG 1100 HT
 - 3/58 - MAG 1100 F
 - 3/69 - MAG 3100 and MAG 3100 HT
 - 3/85 - MAG 3100 P
 - 3/92 - MAG 5100 W
- 3/104 Transmitter TRANSMAG 2 with sensor 911/E
- 3/114 Battery-operated water meter MAG 8000
- 3/121 - MAG 8000 for abstraction and distribution network applications (7ME6810)
- 3/125 - MAG 8000 CT for revenue and bulk metering (7ME6820)
- 3/131 - MAG 8000 for irrigation appl. (7ME6880)

SITRANS F C (coriolis)

- 3/140 System information
- Flowmeter
 - 3/149 - Flowmeter SITRANS FC430
 - 3/156 - Flowmeter SITRANS FC410
 - 3/163 - Flow sensor SITRANS FCS400
 - 3/173 - Transmitter SITRANS FCT030
 - 3/177 - Flowmeter - Accessories/Spare parts
- Transmitter
 - 3/180 - MASS 6000 IP67 compact/remote
 - 3/185 - MASS 6000 for 19" insert/19" wall mounting
 - 3/194 - MASS 6000 Ex d compact/remote
 - 3/199 - SIFLOW FC070
- Flow sensors
 - 3/203 - SITRANS FCS200
 - 3/208 - MASS 2100 DI 1.5
 - 3/212 - SITRANS FC300
 - 3/217 - MASS 2100 DI 3 to DI 40
 - 3/228 - MC2

SITRANS F US (ultrasonic)

- 3/235 Inline ultrasonic flowmeters
- 3/236 System information
- Transmitters
 - 3/244 - SITRANS FUS060
 - 3/251 - SITRANS FUS080/FUE080
- Flowmeters
 - 3/258 - SONO 3300/FUS060
 - 3/264 - SONO 3100/FUS060
 - 3/273 - SONOKIT (with FUS060 or FUS080)
 - 3/284 - SITRANS FUS380 standard
 - 3/289 - SITRANS FUE380 with CT approval
 - 3/297 - SITRANS FUS380 and FUE380
Dimensional drawings and Schematics
- Energy calculator
 - 3/300 - SITRANS FUE950

SITRANS F US (ultrasonic)

- 3/311 Clamp-on ultrasonic flowmeters
- 3/313 System information
- 3/327 Thickness gauge
- 3/328 SITRANS FUS1010 (Standard)
- 3/338 SITRANS FST020 (Basic)
- 3/342 SITRANS FUP1010 (Portable)
- 3/348 SITRANS FUP1010 Water/Liquid
Check metering kits
- 3/350 SITRANS FUE1010 (Energy)
- 3/358 SITRANS FUE1010 (HVAC) Check
metering kit
- 3/360 SITRANS FUH1010 (Oil)
- 3/367 SITRANS FUG1010 (Gas)
- 3/374 SITRANS FUG1010 Gas Check
metering kit
- 3/375 SITRANS FUT1010 (Liquid and Gas)
- 3/385 Accessories/Spare parts

SITRANS F X (vortex)

- 3/393 SITRANS FX300

SITRANS F VA

- 3/410 SITRANS FVA250 variable area meter

SITRANS F O delta p - Primary differential pressure devices

- 3/419 Technical description
- 3/425 Pressure equipment directive 97/23/EC
- 3/428 SITRANS F O - Questionnaire online
- 3/429 Orifice plate with annular chamber
- 3/435 Orifice plate with single tapping
- 3/440 Metering pipe with orifice plate and annular chamber
- 3/444 Calculation of primary devices

SITRANS F R (liquid meters)

- Rotary-piston meters and automatic batch-meters
- 3/445 - Introduction
- 3/450 - Ordering data rotary-piston meters
- 3/455 - Ordering data automatic batchmeters
- 3/456 - Dimensional drawings
- 3/457 SITRANS F RA110 electric flow register
- 3/459 Pulsar with inductive pick-up





You can download all instructions, catalogs and certificates for SITRANS F free of charge at the following Internet address:
www.siemens.com/sitransf

Flow Measurement

Product overview

Overview






	Application	Description	Catalog page	Software for parameterization
SITRANS F M electromagnetic flowmeters - Pulsed DC magnetic flowmeter				
	Designed in robust IP67 polyamide enclosures for compact or remote mounting. 19", back of panel and front of panel enclosure program.	Transmitter MAG 5000/6000 <ul style="list-style-type: none"> • Superior signal resolution for optimum turn down ratio • Comprehensively self-diagnostic, for error indication and logging • Multi-lingual display and keypad interface • Custody transfer approval: PTB K7.2, OIML R 117, OIML R 49 and MI-001 	3/33	SIMATIC PDM
	Designed in robust die-cast aluminum enclosure for demanding applications and where explosion proof protection is necessary.	Transmitter MAG 6000 I/6000 I Ex <ul style="list-style-type: none"> • Remote and compact mounting with all sensors • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet • Ex Approval: ATEX, IECEx, FM, UL, CSA • Multi-lingual display and touchpad keypad • Comprehensively self-diagnostic 	3/45	SIMATIC PDM
	Designed for the general industry environment The obstructionless performance of this sensor is unaffected by the suspended solids, viscosity and temperature challenges.	Flow sensor MAG 1100 <ul style="list-style-type: none"> • Metering tube DN 2 ... DN 100 (1/12" ... 4") flangeless design. • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet • Corrosion-resistant AISI 316 stainless steel housing. • Highly resistant liner (ceramic or PFA) and electrodes fitting most extreme process media. • Temperature rating up to 200 °C (390 °F) • Ex Approval: ATEX, FM 	3/50	
	Specially designed for the food & beverage and pharmaceutical industry 	Flow sensor MAG 1100 F <ul style="list-style-type: none"> • AISI 316 stainless steel enclosure • Hygienic seal, 3A and EHEDG • Easy to clean • Supplied with connections according to your specification • Ex Approval: ATEX, FM 	3/58	
	The MAG 3100 series with its flexibility in the choice of liner, electrode and flange material allows the measurement of even the most extreme process media.	Flow sensor MAG 3100 <ul style="list-style-type: none"> • For a wide range of pipe dimensions: DN 15 ... DN 2000 (1/2" ... 78") • Wide range of liner and electrode materials • High-temperature version for application with temperatures up to 180 °C (355 °F) • High-pressure solutions • Custody transfer approval: PTB, OIML R 117 	3/69	






	Application	Description	Catalog page	Software for parameterization
	Designed for all water and waste water applications in water plants and industrial applications	Flow sensor MAG 5100 W <ul style="list-style-type: none"> • Metering tube DN 15 ... DN 1200 (DN 2000) (½" ... 48" (78")) • Hard Rubber or EPDM lining • Integral grounding electrodes as standard • Increased low flow accuracy for water leak detection • Drinking water approvals and custody transfer approvals , OIML R 49, MI-001 and PTB K7.2 	3/92	
SITRANS F M electromagnetic flowmeters - High-power AC magnetic flowmeter				
	Designed for heavy-duty applications like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles	Transmitter TRANSMAG 2 <ul style="list-style-type: none"> • Magnetic flowmeter with a very strong pulsed AC magnetic field • PROFIBUS PA or HART communication • Comprehensive self-test function • Ex approval: ATEX, IECEx, FM, UL, CSA 	3/104	SIMATIC PDM
	Designed for heavy-duty applications-like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles	Flow sensor 911/E <ul style="list-style-type: none"> • Metering tube: DN 15 ... DN 1000 (½" ... 40") • Metering tube liner: Hard Rubber, Linatex, Soft rubber, PTFE and Novolak • Integral smartPLUG for storing of calibration values • Multi-lingual display and touchpad keypad • Only remote version 	3/104	
SITRANS F M electromagnetic flowmeters - Battery-operated magnetic water meter				
	Battery-operated electromagnetic water meter for water applications within abstraction, distribution network, revenue metering and irrigation	Water meter MAG 8000 <ul style="list-style-type: none"> • Battery- and/or mains power operated water meter • Metering tube DN 25 ... DN 1200 (1" ... 48") • Remote and compact installation IP68/ NEMA 6P enclosure • Custody transfer approval: PTB K7.2, OIML R 49 and MI-001 • Drinking water approvals • Communication modules: GSM/GPRS, Modbus, Encoder 	3/114	SIMATIC PDM and Flow Tool

Flow Measurement

Product overview

3

	Application	Description	Catalog page	Software for parameterization
SITRANS F C mass flowmeters				
	<p>Designed for a variety of liquid and gas applications</p> <p>Measurement of mass flow, density, temperature and fraction</p> 	<p>Flowmeters FC430 (Dual tube design)</p> <ul style="list-style-type: none"> • DN 15, DN 25, DN 50 and DN 80 • Flow from 0.2 ... 181 000 kg/h (400 000 lb/h) - water • Pipe material: AISI 316L • Accuracy, typically: Flow: $\leq 0.1\%$, Density: $\leq 0.005 \text{ g/cm}^3$ • Liquid temp./pressure: $-50 \dots +200 \text{ }^\circ\text{C}$ ($-58 \dots +392 \text{ }^\circ\text{F}$)/up to 100 bar (1450 psi) • Approvals: ATEX, IECEx, FM CSA, NEPSI, OIML R 117, SIL 2/3, EHEDG, 3A 	3/149	
	<p>Designed for a variety of liquid and gas applications</p> <p>Measurement of mass flow, density, temperature</p> <p>Modbus RS 485 RTU communication for direct integration into skids, OEM and pre-assembled plant packages</p>	<p>Flowmeters FC410 NEW (Dual tube design)</p> <ul style="list-style-type: none"> • DN 15, DN 25, DN 50 and DN 80 • Flow from 0.2 ... 181 000 kg/h (0.4 ... 400 000 lb/h) • Pipe material: AISI 316L or Hastelloy C22 • Accuracy, typically: Flow: $\pm 0.1\%$, Density: $\pm 0.005 \text{ g/cm}^3$ • Liquid temperature/pressure: $-50 \dots +200 \text{ }^\circ\text{C}$ ($-58 \dots +392 \text{ }^\circ\text{F}$)/up to 160 bar (2321 psi) • Approvals: ATEX, IECEx, FM CSA, NEPSI, OIML R 117, EHEDG, 3A 	3/156	
	<p>Designed for accurate mass flow measurement of gases in high pressure applications</p>	<p>Flow sensor FCS200</p> <ul style="list-style-type: none"> • DN 10, DN 15, DN 25 • Flow from 0 ... 30 000 kg/h • Pipe material: Hastelloy C22 • Accuracy: $\pm 0.5\%$ of rate • Process temperature: $-40 \dots +125 \text{ }^\circ\text{C}$ ($-40 \dots 257 \text{ }^\circ\text{F}$) • Pressure: Up to 350 bar • Ex approvals: ATEX, IECEx, FM • Custody transfer approval: PTB - OIML R 139 	3/203	
	<p>Designed for a variety of liquid and gas applications</p>	<p>Flow sensors MASS 2100 (Single tube design) and FC300</p> <ul style="list-style-type: none"> • DI 1.5, DI 3, DI 6, DI 15, DI 25, DI 40 and DN 4 • Flow from 0.1 ... 52 000 kg/h (114 640 lb/h) • Pipe material: Stainless steel AISI 316L/1.4435; Hastelloy C22/2.4602 • Accuracy, typically: <ul style="list-style-type: none"> - Flow: $\leq 0.1\%$ of flow rate - Density: $\leq 0.0005 \text{ g/cm}^3$ • Liquid temp./pressure: $-50 \dots +180 \text{ }^\circ\text{C}$ ($-58 \dots +356 \text{ }^\circ\text{F}$) / Up to 410 bar (5946 psi) • Approved according to ATEX, UL 	3/208, 3/212	

	Application	Description	Catalog page	Software for parameterization
	Measurement of liquids. Measurement of mass flow, density and temperature.	Flow sensor MC2 Standard (Dual tube design) <ul style="list-style-type: none"> • DN 100 and DN 150 • Flow from 0 ... 510 000 kg/h (112 400 lb/h) • Tube material: AISI 316Ti/1.4571 and Hastelloy C4/2.4610 • Accuracy: ≤ 0.15 % of rate • Density: ≤ 0.001 g/cm³ • Liquid temp.: -50 ... +180 °C (-58 ... +356 °F) • Pressure: < 100 bar (1450 psi) • Approvals: ATEX EEx em [ib] IIC T2 ... T6 	3/228	
	Measurement of liquids and gases Multiparameter transmitter for remote or compact mounting measuring mass flow, density, temperature and fraction e.g. °Brix and °Plato	Transmitters MASS 6000 (IP67, 19", Ex d) <ul style="list-style-type: none"> • Superior signal resolution for optimum-turn down ratio • Comprehensively self-diagnostic, for error indication and logging • Adaptive batch function • Multi-lingual display and keypad interface • Approvals: ATEX [EEx ia] IIC T6 • Ex Approval: ATEX, IECEx, C-UL • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet 	3/180, 3/194	SIMATIC PDM
	Measurement of liquids and gases Multiparameter transmitter for remote or compact mounting measuring mass flow, density, temperature and fraction e.g. °Brix and °Plato	Transmitters SIFLOW FC070 Standard and Ex CT <ul style="list-style-type: none"> • Digital signal processing measuring 30 times a second. • 3 current, 2 freq. and 2 relay outputs • Adaptive batch function • SENSORPROM memory unit making it easy to start up the flowmeter. • Direct integration into SIMATIC S7 and SIMATIC PCS7 • Automation systems • Ex approval: Ex Approval: ATEX, IECEx, FM • Custody transfer approval: PTB - OIML R 139 	3/199	SIMATIC PDM SIMATIC STEP 7 SIMATIC PCS 7
SITRANS F US ultrasonic inline flowmeters				
	SITRANS FUS060 is a time-based transmitter designed for ultrasonic flowmetering in pipes for the F US inline industry series up to DN 4000	SITRANS FUS060 transmitter <ul style="list-style-type: none"> • Die cast aluminum enclosure • EEx approved according to ATEX • HART communication + 1 analog output, 1 digital output for frequency or pulse and 1 relay output for alarms and flow direction • PROFIBUS PA communication with 1 digital output for frequency or pulse • Multi-functional output for process control • Easy menu based local operation with two-line display 	3/244	SIMATIC PDM
	SITRANS FUS080 is a time-based transmitter designed for ultrasonic flowmetering in pipes for the SONOKIT, FUS380 and FUE380 series up to DN 1200	SITRANS FUS080 transmitter <ul style="list-style-type: none"> • Battery or mains-powered • Easy one-button operation • Bidirectional measuring • IrDA optical eye communication • Robust polyamide enclosure 	3/251	SIMATIC PDM

Flow Measurement

Product overview

3

	Application	Description	Catalog page	Software for parameterization
	<p>The main application for SONO 3300 ultrasonic flowmeters is to measure the volume flow of:</p> <ul style="list-style-type: none"> • Water and treated waste water • Oil and liquefied gases • Hot water/cooling systems 	<p>SONO 3300/FUS060</p> <ul style="list-style-type: none"> • ATEX-approved • DN 50 ... DN 300 (2" ... 12") steel pipes • PN 10 ... PN 40 or class 150 ... class 300 pressure rates • Flow 0.3 ... 3200 m³/h (1.3 ... 14 089 GPM) • No pressure drop • FUS060 transmitter for separate mounting • Signal cables from sensor to transducer are highly protected from aggressive environment by stainless steel pipes 	3/258	SIMATIC PDM
	<p>The main application for SONO 3100 ultrasonic flowmeters is to measure the volume flow of:</p> <ul style="list-style-type: none"> • Water and treated waste water • Oil and liquefied gases • Liquid cryogenic application • District heating systems 	<p>SONO 3100/FUS060</p> <ul style="list-style-type: none"> • DN 100 ... DN 600 (4" ... 24") • Pipe in carbon steel • Transducers can be replaced under pressure • FUS060 transmitter for separate mounting • ATEX-approved • Measure of all liquids less than 350 Cst, conductive or non-conductive • No pressure drop • 1-path; 4-path on request • Special material on request 	3/264	SIMATIC PDM
	<p>Installation of one, two or four transducer sets in existing concrete or steel pipes. Typically installed in pipes with large diameters or in hot/cold water applications</p>	<p>SONOKIT</p> <ul style="list-style-type: none"> • FUS060 or FUS080 transmitter for separate mounting • DN 100 ... DN 4000 (4" ... 160") • Control and display unit • Temperature of medium: -20 ... +200 °C (-4 ... +395 °F) • Installation on empty pipes or pipes under pressure (hot-tap installation) • Standard 1-path or 2-path (4-path on request) 	3/273	SIMATIC PDM
	<p>Battery or mains-powered ultrasonic flowmeter for use within water-based district heating, cooling systems and utility.</p> <p>The FUS380 can also be used for water irrigation systems.</p> <p>SITRANS FUS380/FUE380 are designed to work with the SITRANS FUE950 energy calculator.</p>	<p>FUS380/FUE380</p> <ul style="list-style-type: none"> • <i>FUS380/FUE380</i>: DN 50 ... DN 1200 (2" ... 48") • <i>FUE380</i>: Approved for custody transfer according to EN 1434 Class 2, OIML R 75, MID and MI004 • <i>FUS380/FUE380</i>: Red brass or painted carbon steel flanges and metering tube. AISI transducers • Water temperatures 2 ... 200 °C (35.6 ... 392 °F) • Battery or mains-powered 	3/284, 3/289	SIMATIC PDM
	<p>Universal thermal energy calculator for district heating and cooling applications.</p>	<p>SITRANS FUE950</p> <ul style="list-style-type: none"> • Battery or mains-powered • 24 periods memory • 2 ports for plug-in modules as data output, extra input, M-Bus, RS 232/RS 485, current output • Complete set with temperature sensors and pockets • MID heating approval, PTB K7.2 cooling approval, MI004 type approval 	3/300	


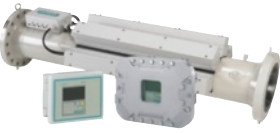
	Application	Description	Catalog page	Software for parameterization
SITRANS F US ultrasonic clamp-on flowmeters				
	<p>The thickness gauge can be used in any field application where there is a need for flow measurement. Including but not limited to:</p> <ul style="list-style-type: none"> • Water and waste water • Energy measurement • Oil and gas industries 	<p>Thickness gauge</p> <p>The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipes.</p> <ul style="list-style-type: none"> • Materials include steel, aluminum, titanium, plastics and ceramics • Measurements shown in millimeter or inches • Simple-to-read 4-digit LCD display • Weights 150 g (5.3 oz) • Battery operation for 250 h 	3/327	
	<p>Dedicated flowmeters are suitable for a wide variety of liquid applications, including those in the:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry 	<p>SITRANS FUS1010 General purpose</p> <ul style="list-style-type: none"> • Suitable for virtually any liquid, even those with high aeration or suspended solids • Full range of safety approvals, I/O's and enclosure types available • Has wide applicability but not the special functions found in FUH1010, FUG1010 and FUE1010 meters • Hazardous area approvals: FM, CSA, ATEX 	3/328	
	<p>Dedicated flowmeter is a basic option for many clean liquid applications in the:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC & Power Industries • Processing Industry 	<p>SITRANS FST020 Basic</p> <ul style="list-style-type: none"> • Has FUS1010 system function but without the same I/O capability or safety approval ratings • This basic meter is intended for single liquid applications that do not require these features • Not available with hazardous area approvals • Unclassified, ordinary locations approvals: UL, C-UL, CE and C-TICK 	3/338	
	<p>Portable flowmeters are suitable for a wide variety of liquid applications, including those in the:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry 	<p>SITRANS FUP1010 Portable</p> <ul style="list-style-type: none"> • Basic function portable meter • Has all the capabilities of the FUS1010 meter but in a battery-powered, portable configuration • Ideal for high-accuracy flow survey applications • Not available with hazardous area approvals • Unclassified, ordinary location approvals: UL, C-UL, CE 	3/342	
	<p>The SITRANS FUP1010 check meter measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. This basic feature enables the performance check and verification of existing meters used in various water and wastewater applications such as:</p> <ul style="list-style-type: none"> • Water Industry <ul style="list-style-type: none"> - Raw water - Potable water - Chemicals • Wastewater industry <ul style="list-style-type: none"> - Raw sewage - Effluent - Sludges - Mixed liquor - Chemicals 	<p>SITRANS FUP1010 Portable Check metering kit</p> <ul style="list-style-type: none"> • Pipe sizes 25.4 mm ... 9.14 m (1" ... 360") • Current, voltage, frequency and RS 232 outputs • Optional current, voltage and temperature inputs • Zeromatic Path automatically sets zero • Bi-directional flow operation • 1 MByte data logger with both site and data logger storage 	3/348	

Flow Measurement

Product overview

3





	Application	Description	Catalog page	Software for parameterization
	<p>Portable and dedicated energy meters are ideal for thermal energy/power applications:</p> <ul style="list-style-type: none"> • Chilled & hot water submetering • Condenser water, potable water • Glycol and brine solution • Thermal storage 	<p>SITRANS FUE1010 Energy</p> <ul style="list-style-type: none"> • Accurate absolute and differential temperature measurement with two matched 1000 Ω RTD elements installed on supply and return side of the heating or cooling system • Efficiency calculation (kW/ton, EER or COP) available in systems with optional analog input • Dedicated available with hazardous area approvals: FM, CSA • Portable available with unclassified/ordinary locations approval: UL, C-UL, FM 	3/350	
	<p>The SITRANS FUE1010 check metering kit is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real-time coefficient of performance (COP) for HVAC systems. This kit is ideal for applications which include:</p> <ul style="list-style-type: none"> • Chilled water sub-metering • Condenser water • Potable water • Ammonia and glycol • River and lake water • Lake source cooling 	<p>SITRANS FUE1010 HVAC Check metering kit</p> <ul style="list-style-type: none"> • Pipe sizes 25.4 mm ... 9.14 m (1" ... 360") • Built-in energy/BTU mode • 4-wire 1000 Ω platinum RTDs for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F) • Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes: <ul style="list-style-type: none"> - Cooling load (kW/ton) - Coefficient of performance (COP) - Energy efficiency ratio (EER) • Current, voltage, frequency and RS 232 outputs • 1 MByte data logger with both site and data logger storage 	3/358	
	<p>Dedicated hydrocarbon flowmeters are ideal for crude oil, refined petroleum or liquefied gas. There are three application areas:</p> <ul style="list-style-type: none"> • Viscosity compensated volumetric flowmeters • Standard volume (Net) mass flowmeters • Interface detectors/density meters 	<p>SITRANS FUH1010 Oil</p> <ul style="list-style-type: none"> • Volumetric flowmeters output viscosity compensated gross volume to external RTU's or flow computers • Mass flowmeters output standard volume (net) mass flow, API, liquid identification, density, interface & pig detection • Interface Detectors are used for liquid identification and API density output, but do not output flow • Hazardous area approvals: FM, CSA, ATEX 	3/360	
	<p>Dedicated gas flowmeters are ideal for most natural and process gas industry applications, including:</p> <ul style="list-style-type: none"> • Checkmetering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production 	<p>SITRANS FUG1010 Gas</p> <ul style="list-style-type: none"> • Suitable for most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc.) with typical minimum operating pressure of 10 bar g (145 psi g). • Standard volume or mass flow output for fixed gas compositions • Analog input for pressure and temperature compensation • Hazardous area approvals: FM, CSA, ATEX 	3/367	

	Application	Description	Catalog page	Software for parameterization
	<p>The clamp-on SITRANS FUG1010 Gas Check Metering Kit is an all-inclusive solution developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The kit is ideal for applications that include:</p> <ul style="list-style-type: none"> • Check metering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production • Storage 	<p>FUG1010 Check Metering Kit</p> <ul style="list-style-type: none"> • Pipe sizes 50 ... 1200 mm (2 ... 48") up to 15.7 mm (0.62") pipe wall thickness • Analog inputs for pressure and temperature • Internal AGA-8 table for fixed gas composition is available for standard volume computation • Upward compatibility and compliance with AGA-10 speed of sound measurement practice • Bi-directional flow operation 	3/374	
	<p>Ideal for applications within the liquid and gas hydrocarbon industry capable of providing custody transfer accuracy. Both versions are offered in pipe sizes ranging from 4" ... 24" (DN 100 ... DN 600) with flange ratings of ANSI Class 150/300/600 for liquid and 300/600 for gas.</p>	<p>SITRANS FUT1010 Basic</p> <ul style="list-style-type: none"> • WideBeam technology allows for precision flow measurement by reducing the meter's sensitivity to changes in the medium's physical properties • TransLoc permanent mounting system ensures sealing and virtually no maintenance • High viscosity range (up to 2800 Cst) • Completely cavity free design which eliminates any signal degrading build-up or ports to clog • Large bi-directional flow range • Modbus RTU RS 232/485 output available. • Dynamic Reynolds number compensation 	3/375	
SITRANS F X Vortex Flowmeter				
	<p>Measurement of steam, gases and liquids in:</p> <ul style="list-style-type: none"> • Chemical • HVAC/Power plants • Oil & Gas • Food & Beverage • Pharma 	<p>SITRANS FX300</p> <ul style="list-style-type: none"> • Flange DN 15 ... DN 300 (½" ... 12") Sandwich DN 15 ... DN 100 (½" ... 4") • 2-wire device 4 ... 20 mA, with integrated temperature and pressure sensors for compensation • HART communication • Medium temp.: -40 ... +240 °C (-40 ... +464 °F) • Medium pressure: up to 100 bar (1450 psi) • Hazardous area approvals: FM, CSA, ATEX • Compact or remote mounted transmitter 	3/393	

Flow Measurement

Product overview

3

	Application	Description	Catalog page	Software for parameterization
SITRANS F VA variable area meters				
	Measurement of flow of liquids and gases, also highly suitable for corrosive media, high temperatures and high pressures.	SITRANS FVA250 <ul style="list-style-type: none"> All-metal variable area meter with various float materials Connections: DN 15 ... DN 100 (½" ... 4") Temperature of medium: -20 °C ... +300 °C (-4 ... +572 °F) Optionally available with analog output or contacts 	3/410	
SITRANS F O delta p - primary differential pressure devices				
	Measurement of flow with orifice plates and metering pipes for mounting between flanges, e.g. together with SITRANS P transmitters, DS III HART, DS III PROFIBUS PA and DS III FOUNDATION Fieldbus series.	<ul style="list-style-type: none"> Nominal diameters DN 10 ... DN 1000 (0.4" ... 40") Temperature of medium: -200 ... +500 °C (-328 ... +932 °F) for vapors, gases and liquids. SITRANS P transmitters <ul style="list-style-type: none"> DS III HART series DS III PROFIBUS PA series DS III FOUNDATION Fieldbus series 	3/419	
SITRANS F R liquid meters				
	Rotary-piston meters Industrial design for measurement of flowing liquids	<ul style="list-style-type: none"> DN 15 ... DN 80 (½" ... 3") for industrial requirements With the required registers and quantity-preset registers Temperature of medium: -30 ... +300 °C (-22 ... +572 °F) 	3/445	
	Automatic batchmeter Any quantity of liquid can be preselected and filled automatically.	<ul style="list-style-type: none"> DN 25 ... DN 50 (1" ... 2") Temperature of medium: -30 ... +300 °C (-22 ... +572 °F) 	3/445	

Overview

Criteria for selection of flowmeter

Each method for measuring flow has specific properties, and each flow measuring point is characterized by specific requirements. The table shown below compares the properties of the various measuring instruments and thus provides assistance in selection of the optimum device.

This section of the field device catalog includes the following instruments for measuring flow:

- Electromagnetic
- Coriolis mass flow
- Ultrasonic
- Vortex volumetric- and mass flow
- Variable area meter
- Orifice plate
- Rotary-piston meters and drum meters

Measuring principle	Electro-magnetic	Coriolis	Ultrasonic (inline)	Ultrasonic (clamp-on)	Vortex	Variable area meter	Orifice plate	Rotary-piston meter
Medium	Liquid (conductive)	Liquid or gas	Liquid	Liquid or gas	Steam/vapor, gases, liquid	Liquid or gas	Liquid, vapor, gas	Liquid
Nominal diameter	DN 2 ... 2000 (0.08" ... 78")	1.5 ... 150 mm (0.06" ... 6")	DN 50 ... 4000 (2" ... 160") optional down to DN 15 (½")	6.4 mm ... 9.14 m (0.25" ... 360")	DN 15 ... 300 (½" ... 12")	DN 10 ... 100 (0.4" ... 4") G½" ... G3"	DN 10 ... 1000 (0.4" ... 40")	DN 15 ... 80 (½" ... 3")
Temperature range °C (°F)	-40 ... +200 (-40 ... +392)	-50 ... +180 (-58 ... +356)	-200 ... +250 (-328 ... +482)	-40 ... +120 (-40 ... +248)	-40 ... +240 (-40 ... +464)	-20 ... +300 (-4 ... +572)	-200 ... +500 (-328 ... +932)	-30 ... +300 (-22 ... +572)
Max. pressure bar (psi)	160 (2 320), optional higher	Up to 410 (Up to 5 950)	40 (580) optionally 160 (2 320)	Unlimited	100 (1 450)	100 (1 450)	315 (4 569)	63 (914)
Accuracy %	± 0.2 or ± 0.4	± 0.1 or ± 0.15	± 0.5 ... ± 2	0.5 ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s)	± 0.75 ... ± 1	± 1.6 ... ± 2.0	± 0.5 ... ± 2	± 0.2 ... ± 0.5
Repeatability %	0.1/0.2	0.05	0.25	0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s)	0.1	0.5	0.5	0.005
Dynamic response range	1:100	1:100	1:100	1:100	1:25	1:10	1:6	1:10
Start-of-scale value m/s (ft/s)	0 (0)	0 (0)	0 (0)	0 (0)	0.4 (1.31) 2.0 (6.56)	0.2 (0.66)	Re > 500	0.3 (0.98)
Full-scale value				± 36/120			Re < 10 ⁸	
• For liquids m/s (ft/s)	0.25 ... 10 (0.825 ... 32.8)	10 (32.8)	10 (32.8)	± 12/40	10 (32.8)	3.5 (11.4)	3 (9.8)	3 (9.8)
• For steam/vapor, gases m/s (ft/s)		Approx. 300 (1000)		± 12/40	80 (262.5)	60 (197)	50/25 (164/82)	
Measured values								
• Volume flow	•	•	•	•	•	•	•	•
• Sound velocity			•	•				
• Sound amplitude			•	•				
• Density		•		•				
• Mass flow		•	•	•	•			
• Bidirectional measurement	•	•	•	•			•	
Use								
• For custody transfer	•	•	•	•				•
• As batching system	•	•		•				•
• In viscosity range mPa·s (cp)	0.1 ... 100 000 (0.1 ... 100 000)	0 ... 100 000 (0 ... 100 000)	0 ... 350 (0 ... 350)	0.5 ... 2800 (0.5 ... 2800)	0 ... 10 (0 ... 10)	0.5 ... 100 (0.5 ... 100)	0 ... 10 (0 ... 10)	0.3 ... 350 000 (0.3 ... 350 000)
Power supply	Mains or battery	Mains	Mains or battery	90... 240 V AC, 50...60 Hz, 15 VA or 9 ... 36 V DC, 10 W	2-wire	non	2-wire	non

Flow Measurement

Introduction

Communication solutions

Communication solutions

Transmitter	HART	PROFIBUS PA	PROFIBUS DP	FOUNDATION Fieldbus H1	DeviceNet	Modbus RTU	GSM/GPRS
SITRANS F M MAG 5000	• 1) 2) 4)						
SITRANS F M MAG 6000	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 2) 4) 5)	• 5)	• 1) 5) 10)	
SITRANS F M MAG 5000/6000 CT ⁸⁾							
SITRANS F M MAG 6000 I	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 2) 4) 5)	• 5)	• 1) 5) 10)	
SITRANS F M MAG 6000 I Ex	• 1) 2) 4) 5)	• 1) 5) 6) 7)					
SITRANS F M TRANSMAG 2	• 1) 4)	• 1) 6)					
SITRANS F M MAG 8000						• 1) 3) 10) 11) 12)	• 14)
SITRANS F C FCT030	• 1) 2) 4) 8)						
SITRANS F C MASS 6000	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 2) 4) 5)	• 5)	• 1) 10)	
SITRANS F C MASS 6000 Ex d	• 1) 2) 4) 5)	• 1) 5) 6) 7)		• 2) 4) 5)	• 5)		
SIFLOW FC070			• 13)			• 1) 10) 11)	
SITRANS FUS060	• 1)	• 1) 6)					
SITRANS FUS1010 ⁹⁾						• 9) 10) 11)	
SITRANS FX300	• 1)						
SITRANS P DS III Differential pressure and flow	• 1) 2)	• 1) 2) 7)		• 2)			

- 1) Supports SIMATIC PDM
- 2) Supports AMS
- 3) Supports Siemens Flow Tool
- 4) Supports HH275/375
- 5) Pluggable add-on modules
- 6) Profile 2
- 7) Profile 3

- 8) CT versions are not approved with communication modules.
- 9) All wall mount models
- 10) RS 485
- 11) RS 232
- 12) IrDA (Infrared)
- 13) Connected to ET200M PROFIBUS interface
- 14) Only with 7ME6810

Overview

SITRANS F M electromagnetic flowmeters are designed for measuring the flow of electrically conductive mediums.

The full SITRANS F M program consists of three different types of flowmeters making Siemens unique in that it covers all possible applications where electromagnetic flowmeters are a suitable match:

Modular pulsed DC flowmeters cover all ordinary applications within all industries. The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task and application.



SITRANS F M products

Battery-operated water meters (fully electronic) are the perfect match for drinking water applications like network distribution, revenue metering and irrigation where mains power is not available. In addition, it complies with the MID (EU) and OIML R 49 water meter standards and has the MCERTS certificate.



SITRANS F M MAG 8000

High-powered flowmeters are used for difficult applications where other flowmeters cannot stand up to the task. This flowmeter can handle liquids and heavy slurries in industries such as mining, cement and pulp and paper.



SITRANS F M 911/TRANSMAG 2

Flow Measurement

SITRANS F M

System information SITRANS F M

Benefits



Greater flexibility

- Wide product program
- Compact or remote installation using the same transmitter and sensor
- USM II communication platform for easy integration with all systems

Easier commissioning of MAG 5000, 6000, 6000 I

All SITRANS F M pulsed DC electromagnetic flowmeters feature a unique SENSORPROM memory unit which stores sensor calibration data and transmitter settings for the lifetime of the product.

At commissioning the flowmeter commences measurement without any initial programming.

The factory settings matching the sensor size are stored in the SENSORPROM unit. Also customer specified settings are downloaded to the unit. Should the transmitter be replaced, the new transmitter will upload all previous settings and resume measurement without any need for reprogramming.

Further, the „fingerprint“ used in connection with the SITRANS F M Verificator is stored during the initial sensor calibration.

Easier service

Transmitter replacement requires no programming. SENSORPROM automatically updates all settings after initialization.

Room for growth

USM II the Universal Signal Module with "plug & play" simplicity, makes it easy to access and integrate the flow measurement with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.

Application

Electromagnetic flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries.

A prerequisite is that the medium must have a minimum conductivity. The temperature, pressure, density and viscosity have no influence on the result.

The main applications of the electromagnetic flowmeters can be found in the following sectors:

- Water and waste water
- Chemical industries
- Pharmaceutical industries
- Food and beverage industry
- Mining, aggregates and cements industries
- Pulp and paper industry
- Steel industry
- Power; utility and chilled water industry

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Industry

Water / waste water	XX			XX		X	XXX	XXX	X	XXX ¹⁾	XXX ¹⁾
Chemical	XXX	XXX	XX	XXX	XXX	XXX	X	X		X	
Pharmaceutical	XX	XX	XXX	XX	XX	XX	X	X		X	
Food and beverage	XX		XXX	X	X	X	X	X		X	
Mining, aggregates and cement	XX			XXX			X	X	XXX	X	
HPI	XX	X		XX	X	XX	X	X		X	
Other	XX	XX	XX	XX	XX	XX	XX	XX	XXX	X	

Design

Compact	•		•	•	•	•	•	•		•	•
Remote	•	•	•	•	•	•	•	•	•	•	•
Constant field (DC)	•	•	•	•	•	•	•	•		•	•
Alternating field (AC)									•		
Battery-operated constant field (DC)										•	•

Size

DN 2 (1/12")	•										
DN 3 (1/8")	•										
DN 6 (1/4")	•										
DN 10 (3/8")	•		•								
DN 15 (1/2")	•	•	•	•	•	•	•	•	•		
DN 25 (1")	•	•	•	•	•	•	•	•	•	•	
DN 32 (1 1/4")			•								
DN 40 (1 1/2")	•	•	•	•	•	•	•	•	•	•	
DN 50 (2")	•	•	•	•	•	•	•	•	•	•	•
DN 65 (2 1/2")	•	•	•	•	•	•	•	•	•	•	•
DN 80 (3")	•	•	•	•	•	•	•	•	•	•	•
DN 100 (4")	•	•	•	•	•	•	•	•	•	•	•
DN 125 (5")				•	•	•	•	•	•	•	•
DN 150 (6")				•	•	•	•	•	•	•	•
DN 200 (8")				•	•	•	•	•	•	•	•
DN 250 (10")				•	•	•	•	•	•	•	•
DN 300 (12")				•	•	•	•	•	•	•	•
DN 400 (16")				•		•	•	•	•	•	•
DN 450 (18")				•		•	•	•	•	•	•
DN 500 (20")				•		•	•	•	•	•	•
DN 600 (24")				•		•	•	•	•	•	•
DN 700 (28")				•		•	•	•	•	•	•
DN 750 (30")				•		•	•	•	•	•	•
DN 800 (32")				•		•	•	•	•	•	•
DN 900 (36")				•		•	•	•	•	•	•
DN 1000 (40")				•		•	•	•	•	•	•
DN 1050 (42")				•		•	•	•	•	•	•
DN 1100 (44")				•		•	•	•	•	•	•
DN 1200 (48")				•		•	•	•	•	•	•
DN 1400 (54")				•		•	•	•	•	•	•
DN 1500 (60")				•		•	•	•	•	•	•
DN 1600 (66")				•		•	•	•	•	•	•
DN 1800 (72")				•		•	•	•	•	•	•
DN 2000 (78")				•		•	•	•	•	•	•

• = available, X = can be used, XX = often used, XXX = most often used

¹⁾ Not suitable for wastewater applications

Flow Measurement

SITRANS F M

System information SITRANS F M

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Process connection

Wafer design	●	●								
Sanitary process connections			●							

Flanges			●	●	●	●	●	●	●	● ³⁾
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Flange norms

EN 1092-1			●	●	●	●	●	●	●	● ³⁾
ANSI B 16.5 class 150			●	●	●	●	●	●	●	● ³⁾
ANSI B 16.5 class 300			●	●				●		
ASME B 16.47 class 150			●							
AWWA class D			●			●	●	●	●	
AS 2129			●	●						● ³⁾
AS 4087, PN 16			●	●		●	●		●	
AS 4087, PN 21			●	●						
AS 4087, PN 35			●	●						
JIS 10K			●				●	●		
JIS 20K			●							

Pressure rating¹⁾

PN 6			●				●			
PN 10			●	●	●	●	●	●	●	
PN 16	●		●	●	●	●	●	●	●	
PN 25			●	●				●		
PN 40	●	●	●	●	●	●	●	●	●	
PN 63			●							
PN 100			●							

Accuracy

0.2 %	●	●	●	●	●	●	●	●		●
0.4 %	●	●	●	●	●	●	●	●		●
0.5 %								●		
0.8 %										●

Repeatability⁵⁾

0.1 %	●	●	●	●	●	●	●	●		●
0.2 %								●		

Grounding electrodes, incl.²⁾

			●		● ⁴⁾	●	●	(●)	●	
--	--	--	---	--	-----------------	---	---	-----	---	--

Grounding rings premounted from factory

										●
--	--	--	--	--	--	--	--	--	--	---

● = available

¹⁾ Pressure may be limited by the liner material chosen

²⁾ Not for PTFE liner.

³⁾ Drilled pattern flange max. 7 bar (107 psi).

⁴⁾ Optional on PFA

⁵⁾ Of actual flow for $v \geq 0.5$ m/s (1.5 ft/s) and conductivity > 10 μ S/cm

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Materials/temperature:

Liner material/max. temperatures

NBR Hard Rubber: 70 °C (158 °F)							●			
EPDM: 70 °C (158 °F)			●				●		●	
Soft rubber: 70 °C (158 °F)			●					●		
PTFE: 100 °C (212 °F)			●							
PTFE: 130 °C (266 °F)				●	●			●		
PTFE: 180 °C (356 °F)				●				(●) ¹⁾		
Ebonite Hard Rubber: 95 °C (203 °F)			●				● ³⁾	●		● ³⁾
Linatex: 70 °C (158 °F)			●					●		
Ceramic: 150 °C (302 °F)	●		●							
Ceramic: 200 °C (392 °F)		● ²⁾								
PFA: 100 °C (212 °F)			●							
PFA: 150 °C (302 °F)	●		●	●	●					
Novolak: 130 °C (266 °F)								●		

Electrodes

Stainless steel			●	●				●		●
Hastelloy C	●		●	●	●	●	●	●	●	
Platinum	●	●	●	●	●			●		
Titanium			●	●				●		
Tantalum			●	●				●		

Flange/housing material

Carbon steel			●	●	●	●	●	●	●	●
Stainless steel / carbon steel			●	●				●		
Polished stainless steel	●	●	●	●	●					

Approvals

Custody transfer

Cold water - MI-001 (EU)						●			●	
Cold water approval - OIML R 49/OIML R 49 MAA									● ⁴⁾	
Cold water pattern approval - OIML R 49 (Denmark)						● ⁴⁾				
Cold water pattern approval PTB (Germany)	● ⁴⁾		● ⁴⁾	● ⁴⁾						
Hot water pattern approval - PTB (Germany)	● ⁴⁾		● ⁴⁾	● ⁴⁾						
Other media than water pattern approval - OIML R 117 (Denmark)	● ⁴⁾		● ⁴⁾	● ⁴⁾						
Chilled water pattern approval PTB K 7.2						● ⁴⁾			● ⁴⁾	
OE12/C 040 (Austria) Chilled water pattern approval						●				

● = available

¹⁾ 150 °C (302 °F)

²⁾ Ex sensor: 180 °C (356 °F)

³⁾ 70 °C (158 °F)

⁴⁾ For verification submit Product Variation Request

Flow Measurement

SITRANS F M

System information SITRANS F M

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Approvals (continued)

Hazardous areas

ATEX - 2 GD (Zone 1/21)	●	●	●	●	●	●				
IECEX Gb Zone 1/21				●	●	●				
FM Class I/II/III, Div 1				● ⁹⁾	● ⁹⁾	● ⁹⁾				
FM Class I, Zone 1/21				●	●	●				
FM Class I, Div 2	●	●	●	●	●	●	●	●		
CSA Class I, Zone 1/21				●	●	●				
CSA Class I, Div 2				●	●	●	●	●		

Hygienic

EHEDG			●							
3A			●							
EC 1925:2003 European food contact material			●							

Drinking water

WRAS (WRc) - (UK)				●			● ⁴⁾	●		●	●
ANSI/NSF 61 (US) ⁸⁾				● ⁵⁾			●	●		●	●
ACS (FR) EPDM liner				●			●			●	
Belgaqua (B) EPDM liner				●			●			●	
DVGW-W270 (D) EPDM liner				●			●			●	
MCERTS (UK environmental)				● ⁶⁾			● ⁴⁾			●	

Other

FM Fire Service (class number 1044)							● ⁷⁾			● ⁷⁾	
GOSS/GOST (Russia)	●	●	●	●	●	●	●			●	
CRN (Canada)	● ¹⁾		● ¹⁾	●	●	●	●				
PED 97/23 EC	●	●	●	●	●	●	●	●	●	●	
VdS							● ³⁾				
Other national approvals, see internet	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾	● ⁸⁾
Verifactor compatible	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾		

● = available

¹⁾ Only PFA liner.

²⁾ Only in combination with MAG 5000 and MAG 6000 transmitters.

³⁾ Only valid for DN 50 to DN 300 (2" to 12")

⁴⁾ EPDM liner

⁵⁾ Only EPDM with Hastelloy electrodes

⁶⁾ EPDM or PTFE liner with AISI 316 or Hastelloy electrodes.

⁷⁾ Sizes: DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges

⁸⁾ Including Annex G

⁹⁾ Only DN 15 to DN 300 (1/2" to 12") with MAG 6000 I Ex, compact mounted

Please see Product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



	MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex	MAG 6000 + Ex Safety barrier	TRANSMAG 2	MAG 8000/MAG 8000 CT	MAG8000 Irrigation
	7ME6910	7ME6920	7ME6930	7ME6930	7ME6920	7ME5034	7ME6810 7ME6820	7ME6880
Industry								
Water / waste water	XXX	XXX	XX	X		X	XXX	XXX
Chemical	X	XX	XX	XXX	X		X	
Pharmaceutical	X	XXX	XX	XXX	X		X	
Food and beverage	XX	XXX	XX				X	
Mining, aggregates and cement	XX	X	XX	X		XXX	X	
HPI	X	X	X	XX			X	
Other	XX	XX	XX	XX		XX	X	
Design								
Compact	●	●	●	●			●	●
Remote	●	●	●	●	●	●	●	●
Constant field (DC)	●	●	●	●	●		●	●
Alternating field (AC)						●		
Battery-operated constant field (DC)							●	●
Enclosure transmitter								
Polyamide, IP67	●	●						
Die-cast aluminum			●	●		●		
Stainless steel		●					● ¹⁾	● ¹⁾
19" rack	●	●			●			
Back of panel	●	●			●			
Panel mounting	●	●			●			
IP67 wall mounting	●	●	●	●	●			
Accuracy								
0.2 %		●	●	●	●		●	
0.4 %	●						●	
0.5 %						●		
0.8 %								●
Repeatability³⁾								
0.1 %	●	●	●	●	●		●	●
0.2 %						●		
Communication								
HART	●	●	●	●	●	●		
PROFIBUS PA		●	●	●	●	●		
PROFIBUS DP		●	●		●			
FOUNDATION Fieldbus H1		●	●	●	●			
DeviceNet		●	●		●			
Modbus RTU/RS 485		●	●		●		● ²⁾	● ²⁾
Encoder interface module (Sensus protocol) for Itron 200WP radio							●	●
GSM/GPRS module							●	
Batching								
		●	●	●	●			

● = available, X = can be used, XX = often used, XXX = most often used

¹⁾ IP68 enclosure

²⁾ Modbus RTU also as serial RS 232

³⁾ Of actual flow for $v \geq 0.5$ m/s (1.5 ft/s) and conductivity > 10 μ S/cm

Flow Measurement

SITRANS F M

System information SITRANS F M

Please see Product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



	MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex	MAG 6000 + Ex Safety barrier	TRANSMAG 2	MAG 8000/ MAG 8000 CT	MAG8000 Irrigation
	7ME6910	7ME6920	7ME6930	7ME6930	7ME6920	7ME5034	7ME6810 7ME6820	7ME6880
Power supply								
24 V	● ¹⁾	● ¹⁾	●	●			● ^{1) 2)}	● ^{1) 2)}
115 V - 230 V	●	●	●	●	●	●	● ²⁾	● ²⁾
Battery							●	
Approvals								
<u>Custody transfer</u>								
Cold water - MI-001 (EU)	●	●					●	
Cold water pattern approval - OIML R 49 (Denmark)	●	●					●	
Cold water approval - OIML R 49/OIML R 49 MAA							●	
Cold water pattern approval PTB (Germany)	●	●						
Chilled water pattern approval PTB K 7.2	●	●					●	
Hot water pattern approval PTB (Germany)		●						
Other media than water pattern approval - OIML R 117 Denmark		●						
OE12/C 040 (Austria) Chilled water pattern approval	●	●						
<u>Hazardous areas</u>								
ATEX - 2 GD (Zone 1/21)				●	(●) ³⁾			
IECEX Gb Zone 1/21				●				
FM Class I/II/III, Div 1				● ⁴⁾				
FM Class I, Zone 1/21				●				
FM Class I, Div 2/Zone 2	●	●	●					
CSA Class I, Zone 1/21				●				
CSA Class I, Div 2	●	●	●					
UL / C-UL- general safety	●	●			●			
<u>Other</u>								
FM Fire Service (1044)	●	●					●	
C - tick (Australia)	●	●	●	●	●			
GOSS / GOST (Russia)	●						●	
VdS	●	●						
Other national approvals, see internet	●	●	●	●	●	●	●	●
Vericator compatible	●	●						

● = available

1) 12/24 V AC/DC

2) Main power with battery backup

3) Only sensor in hazardous area

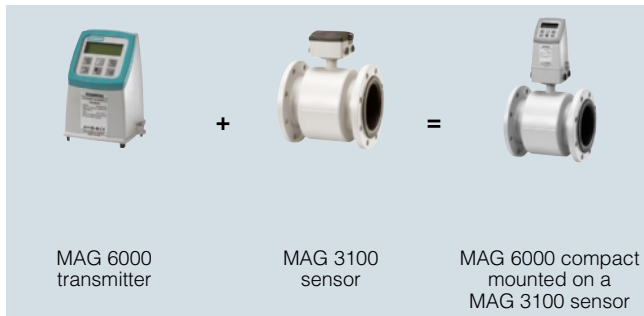
4) Only with sensors sizes DN 15 to DN 300 (½" to 12") compact

For more national approvals please check our internet page

<http://support.automation.siemens.com/WWW/view/en/10806954/134200>

Practical examples of ordering

SITRANS F M compact installation



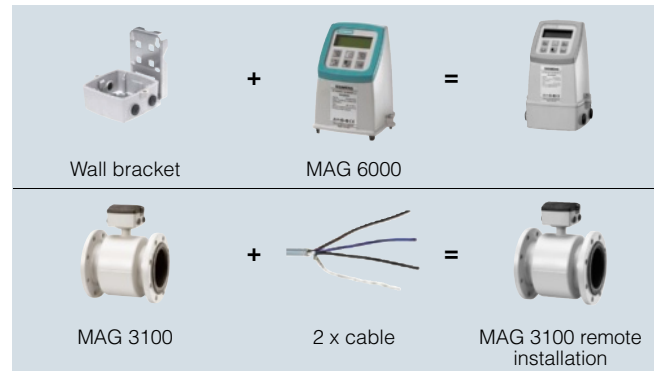
Example

Sensor	7ME6310-3TC11-1JA1
Pipe size	DN 100
Liner	Soft rubber
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	MAG 6000, Polyamide, 115 ... 230 V AC
Accuracy	$\pm 0.2 \% \pm 1 \text{ mm/s}$
Supply	230 V AC

Note:

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place.

SITRANS F M remote installation



Example

Sensor	7ME6310-3TC11-1AA1
Pipe size	DN 100
Liner	Soft rubber
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	7ME6920-1AA10-0AA0
Accuracy	$\pm 0.2 \% \pm 1 \text{ mm/s}$
Supply	230 V AC
Wall mounting kit	FDK:085U1018
Cable kit with sensor cable and electrode cable	A5E01181647

Flow Measurement

SITRANS F M

System information SITRANS F M

Technical specifications

Flowmeter Calibration and traceability

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

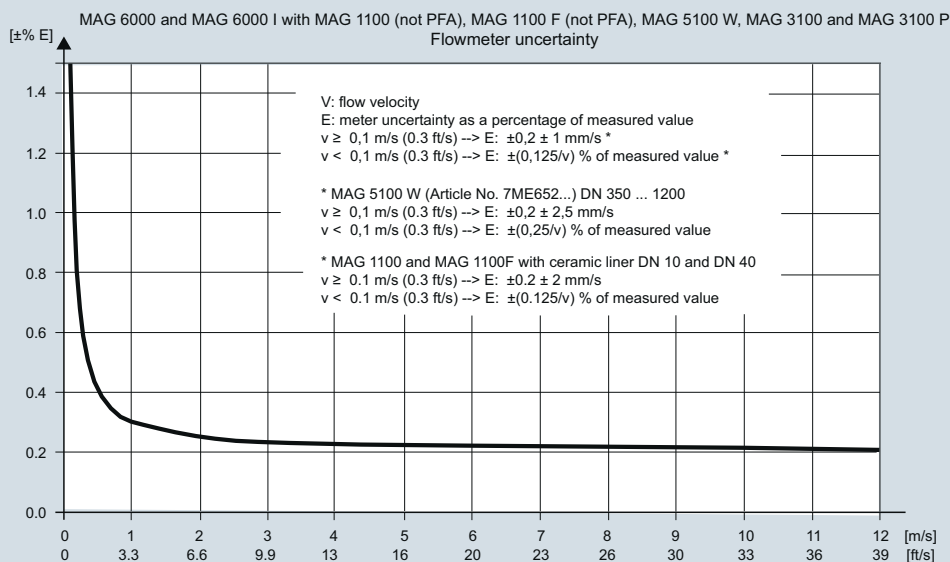
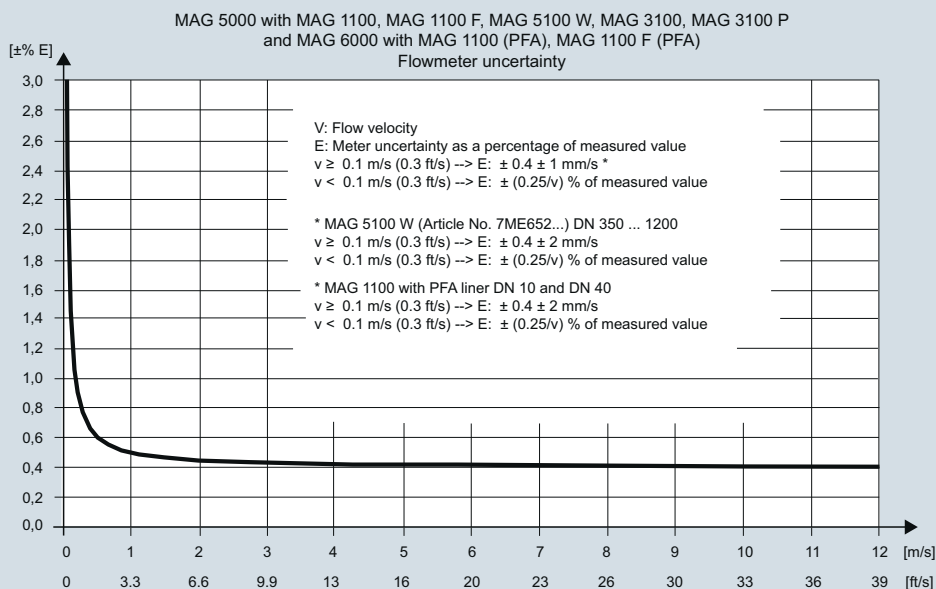
Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h.

Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit.

Flowmeter uncertainty



Calibration reference conditions**Reference conditions (ISO 9104 and DIN EN 29104)**

Temperature medium	20 °C ± 10 K (68 °F ± 18 °F)
Temperature ambient	25 °C ± 10 K (77 °F ± 18 °F)
Supply voltage	$U_n \pm 1 \%$
Warming-up time	30 minutes
Incorporation in conductive pipe section	
• Inlet section	10 x DN (DN ≤ 1200/48") 5 x DN (DN > 1200/48")
• Outlet section	5 x DN (DN ≤ 1200/48") 3 x DN (DN > 1200/48")
Flow conditions	Developed flow profile

Additions in the event of deviations from reference conditions

Current output	As pulse output ($\pm 0.1 \%$ of actual flow + 0.05 % FSO)
Effect of ambient temperature	
• Display / frequency / pulse output	$< \pm 0.003 \%$ /K act.
• Current output	$< \pm 0.005 \%$ /K act.
Effect of supply voltage	$< 0.005 \%$ of measuring value on 1% change
Repeatability	$\pm 0.1 \%$ of actual flow for $v \geq 0.5$ m/s (1.5 ft/s) and conductivity $> 10 \mu\text{S/cm}$

Certificates

• EN 10204-2.1	Certificate of conformity, stating that the delivered parts are made of the material quality that was ordered. Available as Z option C15.
• EN 10204-2.2	Test report certificate, a non batch specific material analysis of the ordered material. Available as Z option C14.
• EN 10204-3.1	Material analysis certificate, a batch specific analysis of the material issued by an independent inspector. Certification covers all pressure containing and wetted parts. Available as Z option C12.

Flow Measurement

SITRANS F M

System information SITRANS F M

Technical specifications

General specifications

PROFIBUS device profile	3.00 Class B
Certified	No
MS0 connections	1
MS1 connections	1
MS2 connections	2

Electrical specification DP

Physical layer specifications

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	RS 485
Transmission speed	≤ 1.5 Mbits/s
Number of stations	Up to 32 per line segment, (maximum total of 126)

Cable specification (Type A)

Cable design	Two-wire twisted pair
Shielding	CU shielding braid or shielding braid and shielding foil
Impedance	35 up to 165 Ω at frequencies from 3 ... 20 MHz
Cable capacity	< 30 pF per meter
Core diameter	> 0.34 mm ² , corresponds to AWG 22
Resistance	< 110 Ω per km
Signal attenuation	Max. 9 dB over total length of line section
Max. bus length	200 m at 1500 kbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA

Physical layer specifications

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	IEC-61158-2
Transmission speed	31.25 Kbits/second
Number of stations	Up to 32 per line segment, (maximum total of 126)
Max. basic current [I _B]	14 mA
Fault current [I _{FDE}]	0 mA
Bus voltage	9 ... 32 V (non Ex)

Preferred cable specification (Type A)

Cable design	Two-wire twisted pair
Conductor area (nominal)	0.8 mm ² (AWG 18)
Loop resistance	44 Ω/km
Impedance	100 Ω ± 20 %
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line termination at both
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data

Required sensor electronics	Compact or remote mounted SITRANS F M MAG 6000 I Ex
FISCO	Yes
Max. U _I	17.5 V
Max. I _I	380 mA
Max. P _I	5.32 V
Max. L _I	0 μH
Max. C _I	0 nF

FISCO cable requirements

Loop resistance R _C	15 ... 150 Ω/km
Loop inductance L _C	0.4 ... 1 mH/km
Capacitance C _C	80 ... 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a MS0 relationship from a Class 1 Master. MS0 specifies cyclic Data Exchange between a Master and a Slave.

Cyclic services

Input (Master view)	Parameter	MAG 6000/MAG 6000 I
	Mass flow	
	Volume flow	✓
	Temperature	
	Density	
	Fraction A ¹⁾	
	Fraction B ¹⁾	
	Pct Fraction A ¹⁾	
	Totalizer 1	✓
	Totalizer 2 ²⁾	✓
	Batch progress ²⁾	✓
	Batch setpoint	✓
	Batch compensation	✓
	Batch status (running ...)	✓
Output (Master view)	Set Totalizer 1+2	✓
	Set Mode Totalizer 1+2	✓
	Batch control (start, stop ...)	✓
	Batch setpoint	✓
	Batch compensation	✓

¹⁾ Requires a SENSORPROM containing valid fraction data.

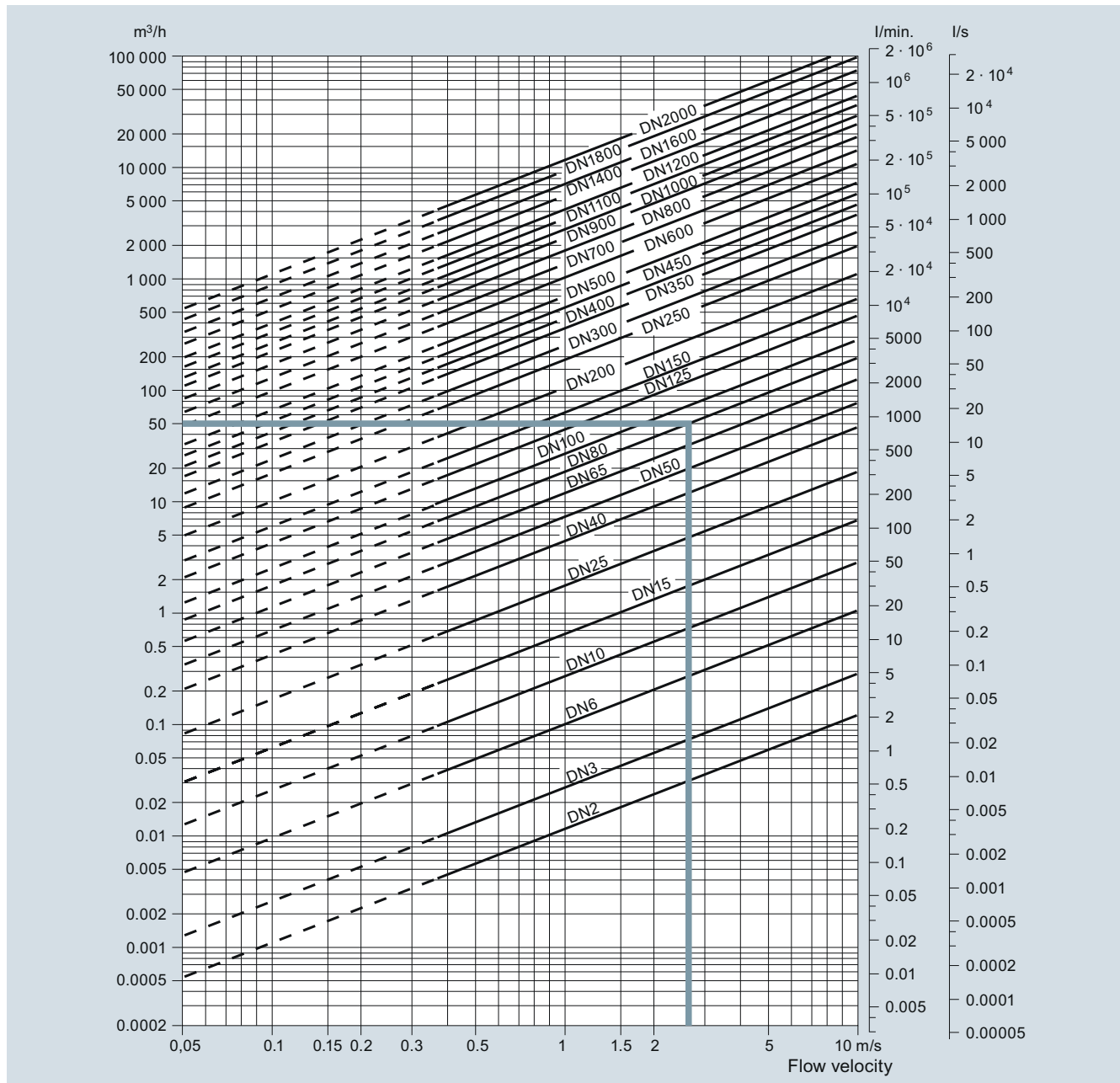
²⁾ Value returned is dependent on the BATCH function.

When ON, Batch progress is returned.

When OFF, TOTALIZER 2 is returned.

Flow and speed chart

Metric



Sizing table (DN 2 ... DN 2000)

The table shows the relationship between flow velocity v , flow quantity Q and sensor dimension DN.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.25 m/s

Max. measuring range: 0 to 10 m/s

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 1 to 3 m/s.

Example:

Flow quantity of 50 m^3/h and a sensor dimension of DN 80 gives a flow velocity of 2.7 m/s, which is within the recommended measuring range of 1 to 3 m/s.

Flow velocity calculation formula Units

$$v = 1273.24 \cdot Q / DN^2 \text{ or}$$

$$v = 353.68 \cdot Q / DN^2$$

$$v : [m/s], Q : [l/s], DN : [mm]$$

$$v : [m/s], Q : [m^3/h], DN : [mm]$$

Link to "Sizing program":

<https://pia.khe.siemens.com/index.aspx?nr=11501>

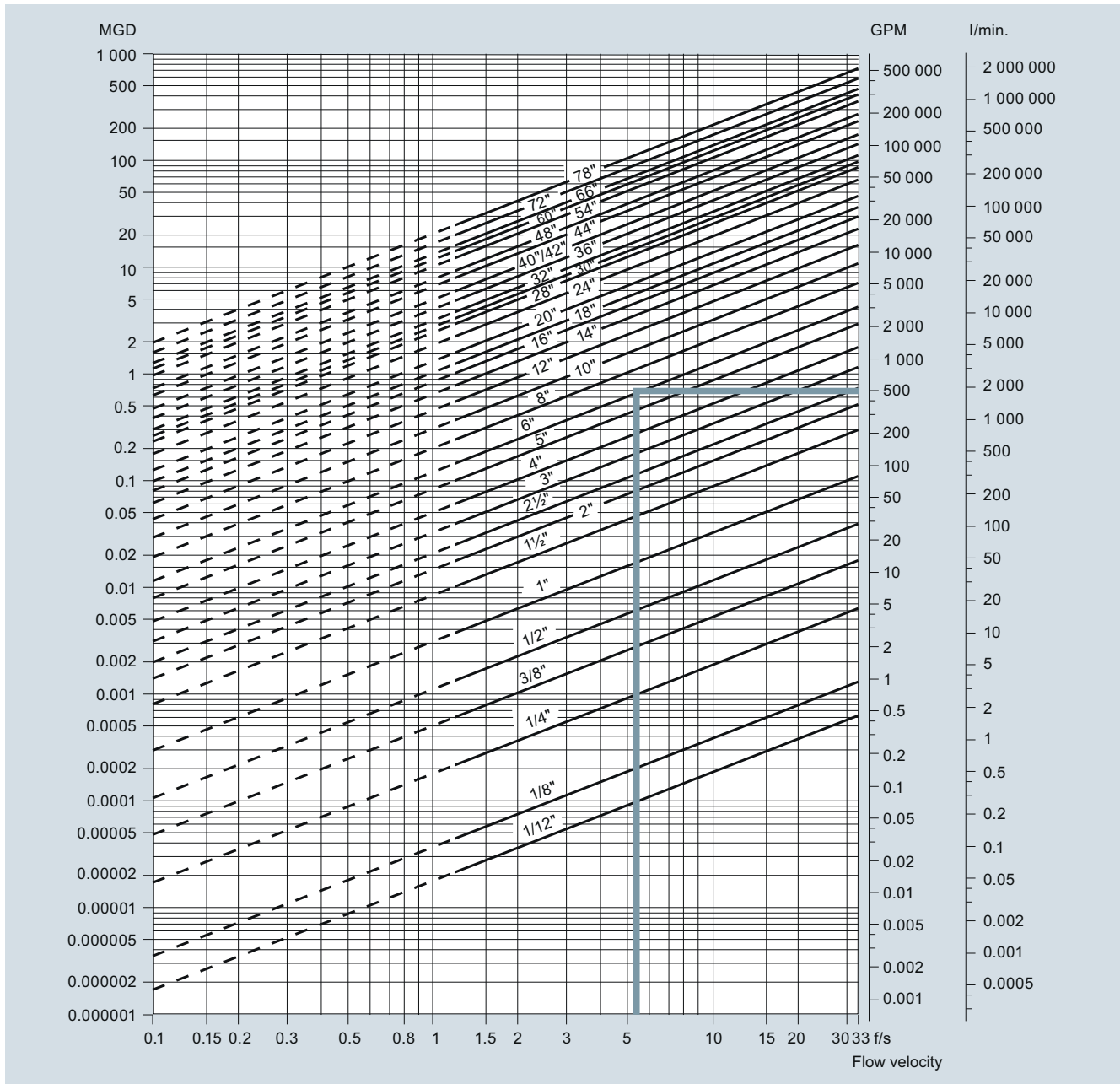
Flow Measurement

SITRANS F M

System information SITRANS F M

Imperial

3



Sizing table (1/12" ... 78")

The table shows the relationship between flow velocity v , flow quantity Q and sensor dimension size.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.8 ft/s

Max. measuring range: 0 to 33 ft/s

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 3 to 10 ft/s.

Example:

Flow quantity of 500 GPM and a sensor dimension of 6" gives a flow velocity of 5.6 ft/s, which is within the recommended measuring range of 3 to 10 ft/s.

Flow velocity calculation formula Units

$v = 0.408 \cdot Q / (\text{Pipe I.D.})^2$ or	v : [ft/s], Q : [GPM], Pipe I.D. : [inch]
$v = 283.67 \cdot Q / (\text{Pipe I.D.})^2$	v : [ft/s], Q : [MGD], Pipe I.D. : [inch]

Link to "Sizing program":

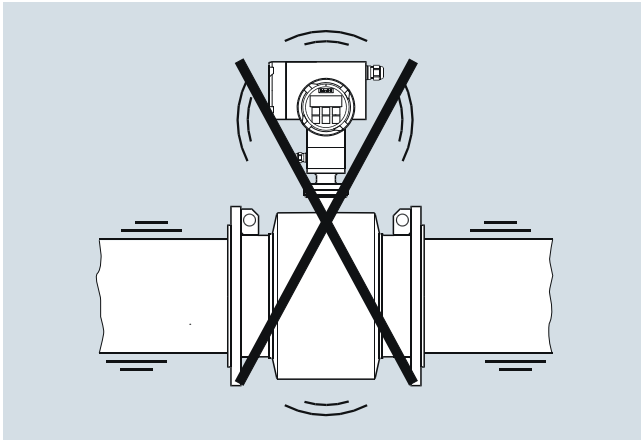
<https://pia.khe.siemens.com/index.aspx?nr=11501>

Installation conditions

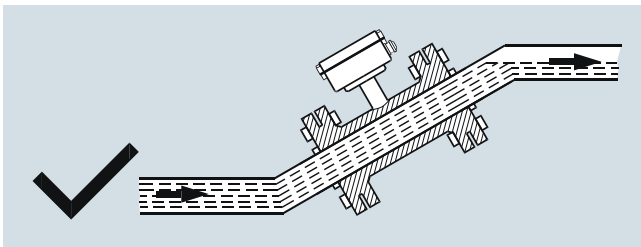
Vibrations

Strong vibrations should be avoided.

In applications with strong vibrations, remote mounting of the transmitter is recommended.



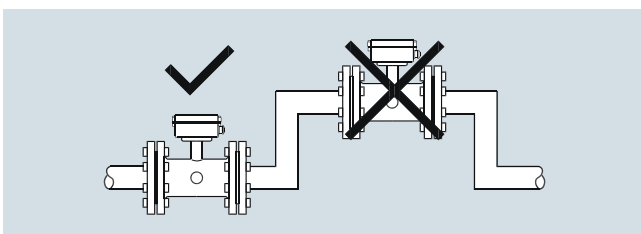
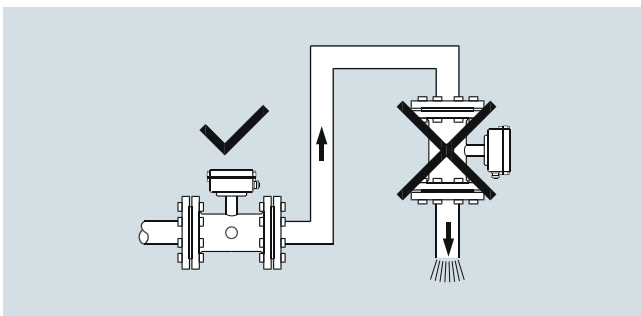
The sensor must always be completely filled with liquid.



Install in pipelines which are always full

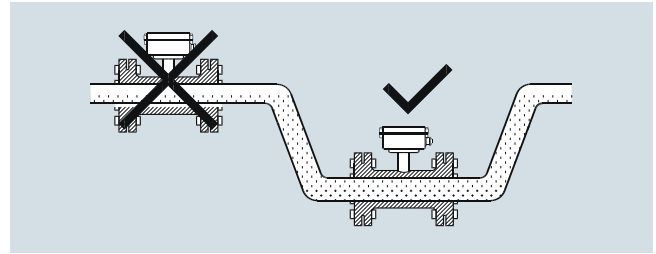
The sensor must always be completely filled with liquid. Therefore avoid:

- Installation at the highest point in the pipe system
- Installation in vertical pipes with free outlet



Do not install in pipelines which can run empty

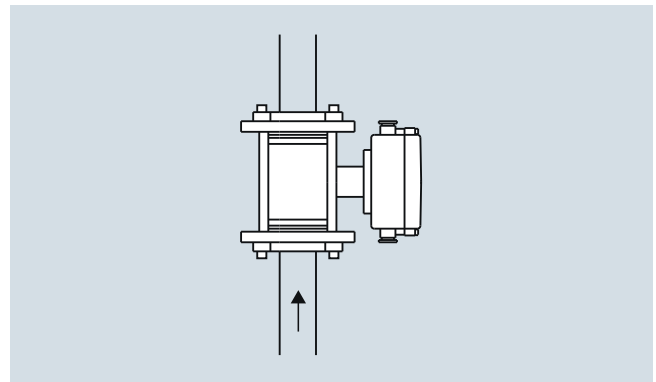
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-Tube.



Install in U-tubes when pipe is partially filled

Installation in vertical pipes

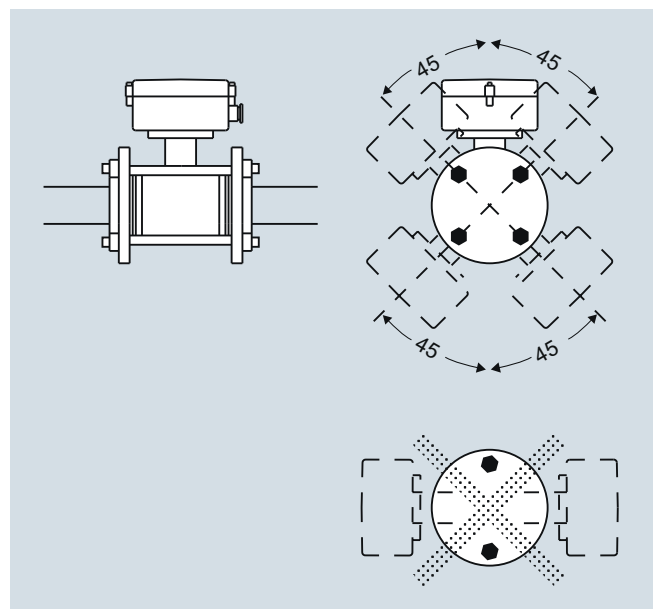
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



Install in vertical pipes with upward flow direction

Installation in horizontal pipes

The sensor must be mounted as shown in the below figure. Do not mount the sensor as shown in the lower figure. This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.



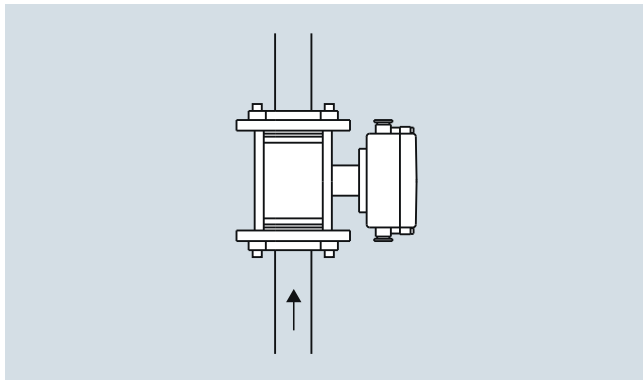
Flow Measurement

SITRANS F M

System information SITRANS F M

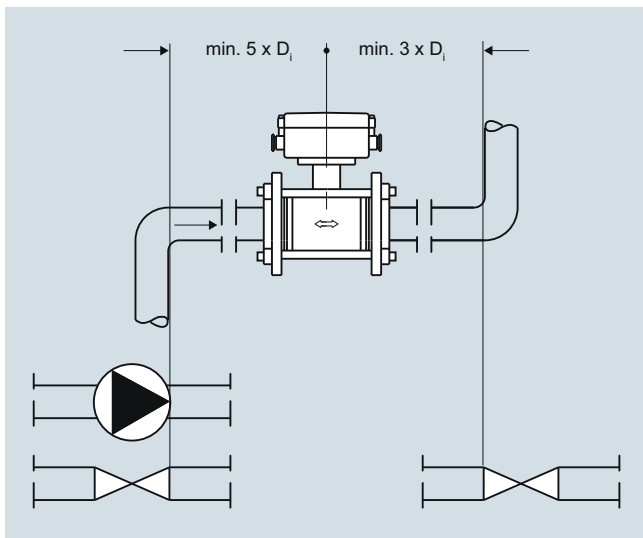
Measuring abrasive liquids and liquids containing particles

Recommended installation is in a vertical/inclined pipe to minimize the wear and deposits in the sensor.



Install in vertical pipelines with upward flow direction if measuring abrasive liquids

Inlet and outlet conditions



Installation between elbows, pumps and valves: standard inlet and outlet pipe sections

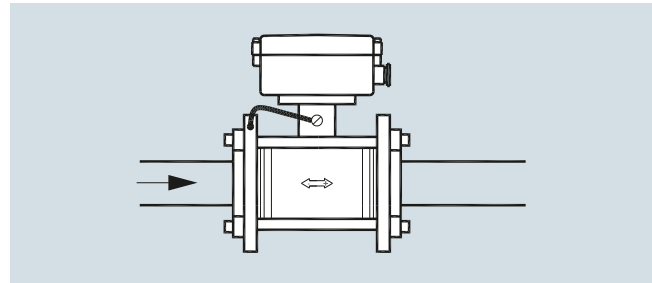
To achieve maximum accurate flow measurement it is essential to have straight length of inlet and outlet pipes and a certain distance between the flowmeter and pumps or valves.

It is also important to center the flowmeter in relation to pipe flange and gaskets.

Ambient temperature-Installation

Temperature changes can cause expansion or contraction in the pipe system. To avoid damage on the sensor use of proper gasket and torque should be ensured. For more information see sensor instruction.

Potential equalization

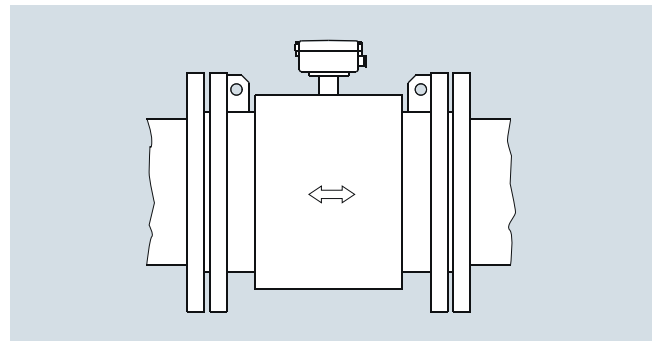


Potential equalization

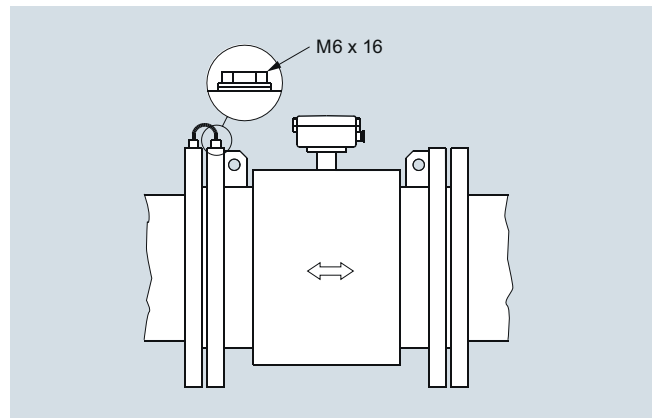
The electrical potential of the liquid must always be equal to the electrical potential of the sensor. This can be achieved in different ways depending on the application:

- Wire jumper between sensor and adjacent flange (MAG 1100, MAG 3100)
- Direct metallic contact between sensor and fittings (MAG 1100 F)
- Build-in grounding electrodes (MAG 3100, MAG 5100 W)
- Optional grounding/protection flanges/rings (MAG 1100, MAG 3100, MAG 8000)
- Optional graphite gaskets on MAG 1100 (standard for MAG 1100 High Temperature)
- MAG 8000 installed in plastic or coated pipes: two grounding rings to be used.

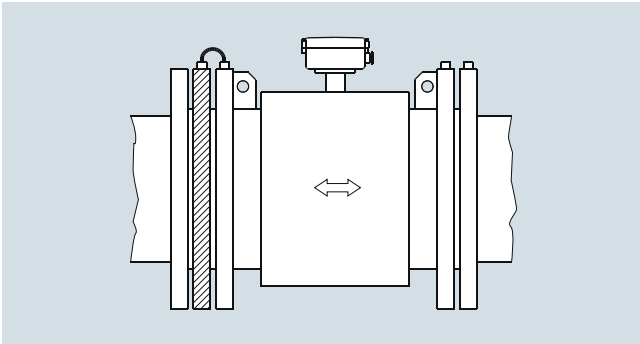
Grounding



MAG 3100 (not PTFE), MAG 5100 W: with earthing electrodes in conductive and non-conductive pipes (no further action necessary)



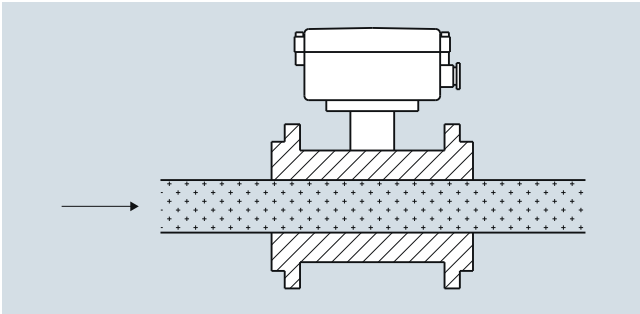
MAG 1100, MAG 3100 (PTFE): without earthing electrodes in conductive pipes (MAG 1100 use graphite gasket)



Without earthing electrodes in non-conductive pipes use grounding ring (MAG 1100 use graphite gasket)

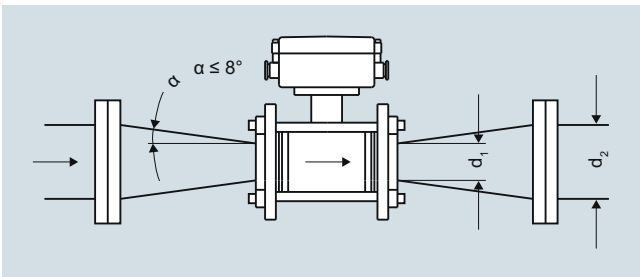
MAG 1100 F grounding via process connections. MAG 8000 grounding see MAG 8000 pages.

Vacuum



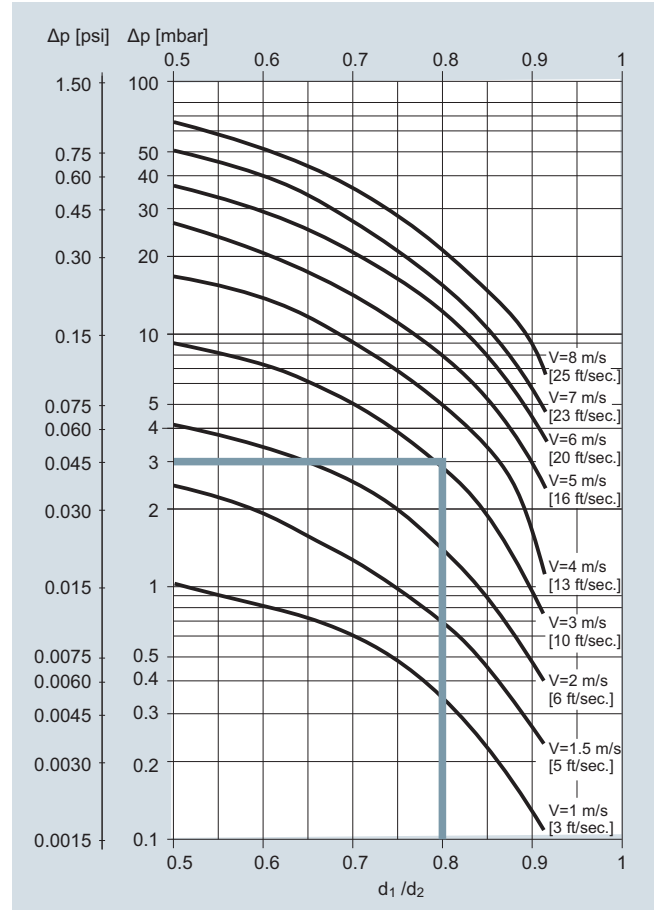
Avoid a vacuum in the measuring pipe, because this can damage certain liners.

Installation in large pipes



Reduction in nominal pipe diameter

The flowmeter can be installed between two reducers (e.g. DIN 28545). Assuming that at 8° the following pressure drop curve applies. The curves are applicable to water.

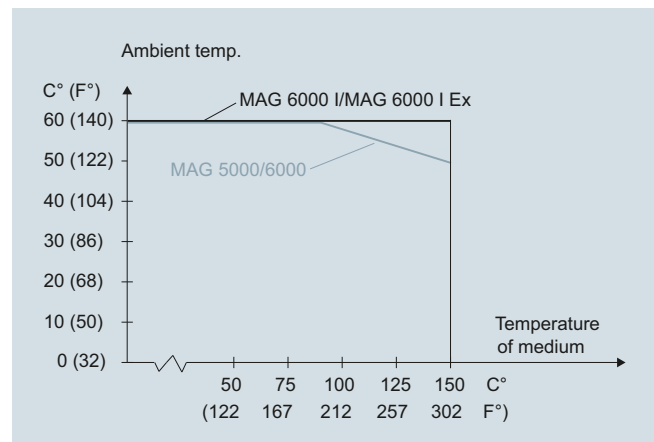


Pressure drop as function of diameter reduction between reducers

Example:

Flow velocity (v) of 3 m/s (10 ft/s) in a sensor with a diameter reduction DN 100 (4") to DN 80 (3") ($d_1/d_2 = 0.8$) gives a pressure drop of 2.9 mbar (0.04 psi).

Ambient temperature



Max. ambient temperature as a function of temperature of medium

The transmitter can be installed either compact or remote.

With compact installation the temperature of medium must be according to the graph.

Flow Measurement

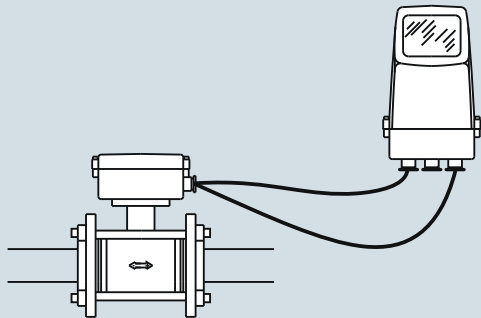
SITRANS F M

System information SITRANS F M

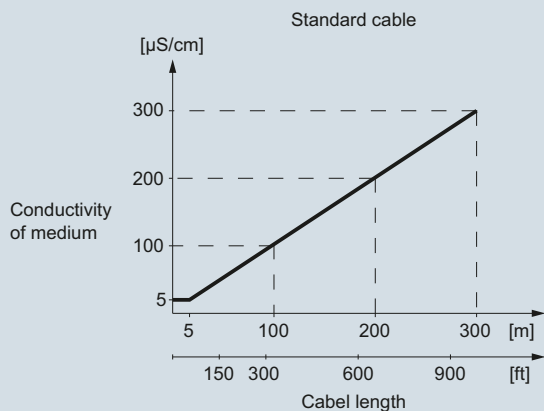
Sensor cables and conductivity of medium

Compact installation:

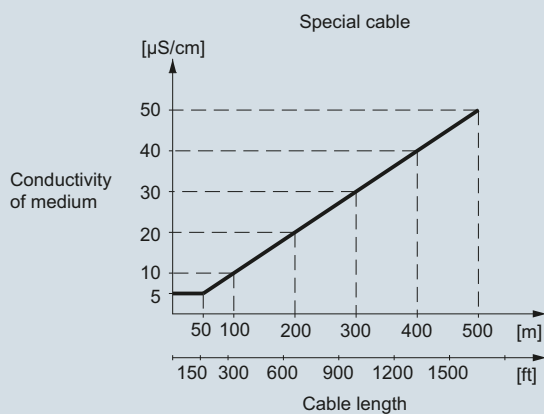
Liquids with an electrical conductivity $\geq 5 \mu\text{S/cm}$.



Remote installation



Minimum conductivity of medium (using standard electrode cable)



Minimum conductivity of medium (using special electrode cable)

Empty pipe detection

The installation has to fulfill the following limitations for usage of the empty pipe detection function:

- media conductivity $\geq 20 \mu\text{S/cm}$
- length of cable at remote installation $\leq 50 \text{ m}$ (150 ft)
- special shield cable must be used

Note for MAG 1100 sizes DN 2 and DN 3:

- empty pipe detection is not available
- the media conductivity must be $\geq 30 \mu\text{S/cm}$

Note for MAG 5000/6000 CT (FW 3.03):

- empty pipe detection is not available

Function

All electromagnetic flowmeters are based on Faraday's law of induction:

$$U_M = B \cdot v \cdot d \cdot k$$

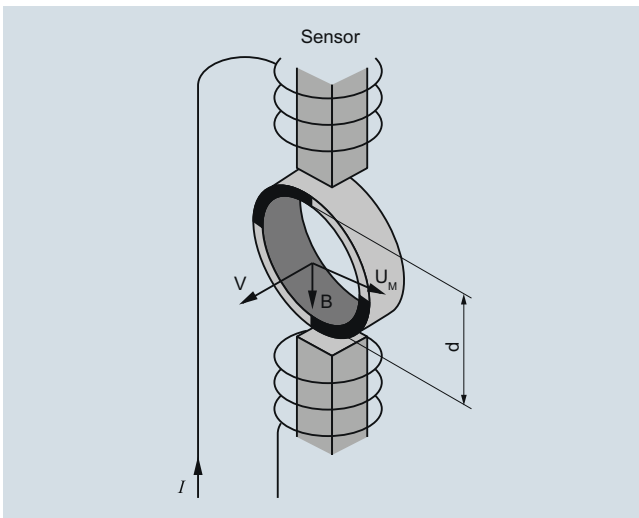
U_M = Measured voltage induced in the medium perpendicular to the magnetic field and the flow direction. The voltage is tapped at two point electrodes.

B = Magnetic flux density which permeates the flowing medium perpendicular to the flow direction.

v = flow velocity of medium

d = internal diameter of metering tube

k = proportionality factor or sensor constant



Function and measuring principle of electromagnetic measurement

An electromagnetic flowmeter generally consists of a magnetically non-conducting metering tube with an internal electrically non-conducting surface, magnet coils connected in series and mounted diametrically on the tube, and at least two electrodes which are inserted through the pipe wall and are in contact with the measured medium. The magnet field coils through which the current passes generate a pulsed electromagnetic field with the magnetic flux density B perpendicular to the pipe axis.

This magnetic field penetrates the magnetically non-conducting metering tube and the medium flowing through it, which must have a minimum electrical conductivity.

According to Faraday's law of induction, a voltage U_M is generated in an electrically conducting medium, and is proportional to the flow velocity v of the medium, the magnetic flux density B , and the distance between the electrodes d (internal diameter of pipe).

The signal voltage U_M is tapped by the electrodes which are in contact with the medium, and passed through the insulating pipe wall. The signal voltage U_M which is proportional to the flow velocity is converted by an associated transmitter into appropriate standard signals such as 4 to 20 mA.

SITRANS F M diagnostics

The diagnostic functions are all internal tools in the meter:

- Identification in clear text and error log
- Error categories: function; warning; permanent and fatal errors
- Transmitter self-check including all outputs and the accuracy
- Sensor check: coil and electrode circuit test
- Overflow
- Empty pipe: partial filling; low conductivity; electrode fouling

SITRANS F M Verificator (MAG 5000 and 6000)

The SITRANS F M Verificator is an external tool designed for MAG 5000 and MAG 6000 with MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 P or MAG 5100 W sensors to verify the entire product, the installation and the application.

The goal is to improve operation, reduce downtime and maintain measurement accuracy as long as possible.

The SITRANS F M Verificator is highly advanced and carries out the complex verification and performance check of the entire flowmeter system, according to unique Siemens patented principles. The whole verification test is automated and easy to operate so there is no opportunity for human error or influence. The system is traceable to international standards and tested by WRc (Water Research Council).



SITRANS F M Verificator

- Stand alone Verificator to measure a number of selected parameters in the flow sensor and a transmitter which affects the integrity of the flow measurement
- Up to 20 measurements can be stored in the Verificator
- The Verificator can be connected via a serial cable to a PC enabling download of the data. A Windows program enables printing and management of verificator reports.

Verification - Steps

Verification of a SITRANS F M flowmeter consists of the following test routines:

1. Transmitter test
2. Flowmeter and cable insulation test
3. Sensor magnetism test

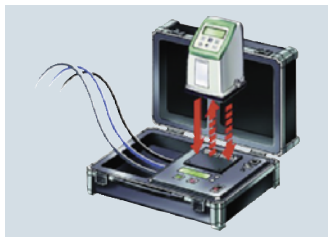
Flow Measurement

SITRANS F M

SITRANS F M Verificator

1. Transmitter test

The transmitter test is the traditional way of on-site testing on the market and checks the complete electronic system from signal input to output.

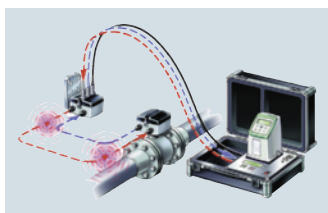


Transmitter test

Using the excitation power output, which is generated to drive the magnetic field of the sensor, the verificator simulates flow signal to the transmitter input. By measuring the transmitter output the verificator calculates its accuracy against defined values. Test includes:

- Excitation power to drive the magnetic field
- Signal function from signal input to output
- Signal processing – gain, offset and linearity
- Test of analogue and frequency output

2. Insulation test



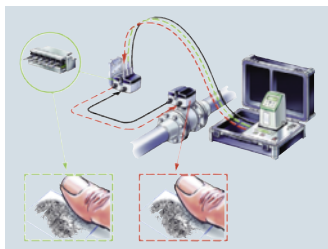
Flowmeter insulation test

The verification test of the flowmeter insulation is a „cross talk“ test of the entire flowmeter which ensures that the flow signal generated in the sensor is not affected by any external influences.

In the "cross-talk" test the verificator generates a high voltage disturbance within the coil circuit and then looks for any "cross-talk" induced in the flow signal circuit. By generating dynamic disturbances close-coupled to the flow signal, the flowmeter is tested for noise immunity to a maximum level:

- EMC influence on the flow signal
- Moisture in sensor, connection and terminal box
- Non-conductive deposit coating the electrodes within the sensor
- Missing or poor grounding, shielding and cable connection.

3. Sensor magnetism test



Sensor magnetism test

The verification of the sensor magnetism is a "boost" test of the magnetic field coil. The test ensures that the magnetism behaviour is like the first time, by comparing the current sensor magnetism with the "fingerprint" which was determined during initial calibration and stored in the SENSORPROM memory unit.

In the "boost" test the verificator changes the magnetic field in certain pattern and with high voltage to get quick stable magnetic condition. This unique test is fulfilled without any interference or compensation of surrounding temperature or interconnecting cabling.

- Changes in dynamic magnetic behaviour
- Magnetic influence inside and outside the sensor
- Missing or poor coil wire and cable connection

Certificate

The test certificate generated by a PC contains:

- Test result with passed or failed
- Installation specification
- Flowmeter specification and configuration
- Verificator specification with date of calibration ensuring traceability to international standards.

MAGFLO® Verification Certificate						
Customer:			MAGFLO® Identification:			
Name			TAG No./Name	0		
Address			Sensor Code No.	7ME634		
			Sensor Serial No.	057701H142		
			Transmitter Code No.	7ME692		
Phone			Transmitter Serial No.	109418N080		
Email			Location			
Results:						
Verification file name or No.			FT-103FT2801			
Transmitter			Passed			
Sensor			Passed			
Insulation			Passed			
Magnetic Circuit			Passed			
Velocity		Current Output			Frequency Output	
Theoretical	Theoretical	Actual	Deviation	Theoretical	Actual	Deviation
0.5m/s	4.800mA	4.802mA	0.25%	0.500kHz	0.501kHz	0.11%
1.0m/s	5.600mA	5.601mA	0.08%	1.000kHz	1.001kHz	0.07%
3.0m/s	8.800mA	8.804mA	0.08%	3.000kHz	3.004kHz	0.14%
Current Output 4-20mA			Frequency Output 0-10kHz			
Transmitter Settings:			Sensor Details:			
Basic	Qmax.	2.00000 m³/h		Size	DN 15 1/2 IN	
	Flow Direction	Positive		Cal. Factor	0.16531426	
	Low flow Cut-off	1.50%		Correction Factor	1.0	
	Empty Pipe	ON		Excitation Freq.	12.5Hz	
Output	Current Output	ON (4-20mA)				
	Time Constant	5.0 Sec.				
	Relay Output	Error Level				
	Digital Output	Pulse				
	Frequency Range	N/A				
	Time Constant	N/A				
	Volume/pulse	1.0 l/p				
	Pulse width	0.51999998 sec.				
	Pulse polarity	Positiv				
Totalizer 1 value before test		819442.93213 l		Verificator Details (083F5060)		
Totalizer 1 value after test		819458.92334 l		Serial No.		
Totalizer 2 value before test		693.87579 l		107920N490		
Totalizer 2 value after test		693.88145 l		Device No.		
Operating time in days		1068		94683		
				Software Version		
				1.40		
				PC-Software Version		
				5.01		
				Cal. date		
				2012.10.26		
				ReCal. date		
				2013.10.26		
Comments						
These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters.						
Verification is traceable to National and International Standards.						
Date and signature						
2013.04.17						

Description

Article No.

SITRANS F M Verificator

- 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 50 Hz
- 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 60 Hz

FDK:083F5060

FDK:083F5061

Note:

It is mandatory to have the Verificator returned to the factory once a year for check and re-verification.

Overview



Transmitter MAG 5000/6000 compact version (left) and 19" insert version (right)

The MAG 5000 and 6000 are transmitters engineered for high performance, easy installation, commissioning and maintenance. The transmitters evaluate the signals from the SITRANS F M sensors type MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 P and MAG 5100 W.

Transmitter types:

- MAG 5000: Max. measuring error $\pm 0.4\% \pm 1 \text{ mm/s}$ (incl. sensor)
- MAG 6000: Max. measuring error $\pm 0.2\% \pm 1 \text{ mm/s}$ (incl. sensor, see also sensor specifications) and with additional features such as: "plug & play" add-on bus modules; integrated batch functions.

Benefits

- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection.
- 3 lines, 20 characters display in 11 languages.
- Flow rate in various units
- Totalizer for forward, reverse and net flow as well as additional information available
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging (see under SITRANS F M diagnostics)
- Batch control (MAG 6000 only)
- Custody transfer approval: PTB, OIML R 117, OIML R 49, MI-001, PTB K 7.2 and OE12/C 040 for chilled water
- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, Modbus RTU/RS 485, PROFIBUS PA and DP

Application

The SITRANS F M flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries. The main applications can be found in:

- Water and waste water
- Chemical and pharmaceutical industries
- Food and beverage industries
- Power generation and utility

Design

The transmitter is designed as either IP67 NEMA 4X/6 enclosure for compact or wall mounting or 19" version as a 19" insert as a base to be used in:

- 19" rack systems
- Panel mounting IP20/NEMA 1 (prepared for IP65/NEMA 2 display side)
- Back of panel mounting IP20/NEMA 1
- Wall mounting IP66/NEMA 4X

Several options on 19" versions are available such as:

- Transmitters mounted in safe area for Ex ATEX approved flow sensors (incl. barriers)
- Transmitters with electrode cleaning unit on request

Function

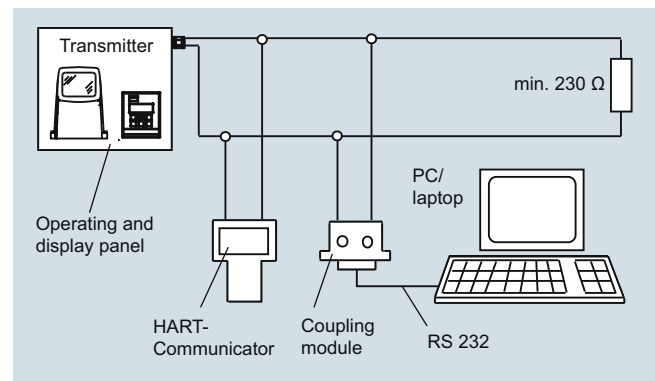
The MAG 5000/6000 are transmitters with a built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

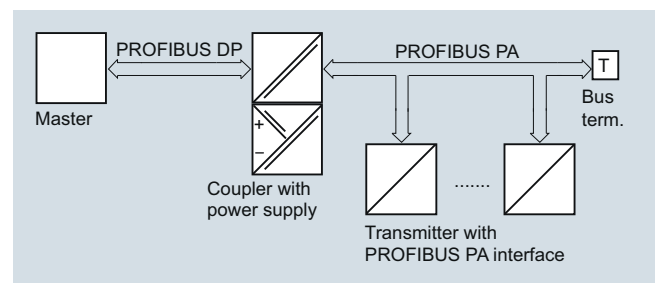
Displays and controls

Operation of the transmitter can be carried out using:

- Control and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or Modbus communication



HART communication



PROFIBUS PA communication

Flow Measurement

SITRANS F M

Transmitter MAG 5000/6000

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	$> 1 \times 10^{14} \Omega$
Input	
Digital input	11 ... 30 V DC, $R_i = 4.4 \text{ K}\Omega$
• Activation time	50 ms
• Current	$I_{11 \text{ V DC}} = 2.5 \text{ mA}$, $I_{30 \text{ V DC}} = 7 \text{ mA}$
Output	
Current output	
• Signal range	0 ... 20 mA or 4 ... 20 mA
• Load	$< 800 \Omega$
• Time constant	0.1 ... 30 s, adjustable
Digital output	
• Frequency	0 ... 10 kHz, 50 % duty cycle (uni/bidirectional)
• Pulse (active)	24 V DC, 30 mA, $1 \text{ K}\Omega \leq R_i \leq 10 \text{ K}\Omega$, short-circuit-protected (power supplied from flowmeter)
• Pulse (passive)	3 ... 30 V DC, max. 110 mA, $200 \Omega \leq R_i \leq 10 \text{ K}\Omega$ (powered from connected equipment)
• Time constant	0.1 ... 30 s, adjustable
Relay output	
• Time constant	Changeover relay, same as current output
• Load	42 V AC/2 A, 24 V DC/1 A
Low flow cut off	0 ... 9.9 % of maximum flow
Galvanic isolation	All inputs and outputs are galvanically isolated.
Max. measuring error (incl. sensor and zero point)	
• MAG 5000	0.4 % $\pm 1 \text{ mm/s}$
• MAG 6000	0.2 % $\pm 1 \text{ mm/s}$
Rated operation conditions	
Ambient temperature	
• Operation	<ul style="list-style-type: none"> Display version: -20 ... +60 °C (-4 ... +140 °F) Blind version: -20 ... +60 °C (-4 ... +140 °F) MI-001 version: -25 ... +55 °C (-13 ... +131 °F) Custody Transfer (CT) version: -20 ... +50 °C (-4 ... +122 °F)
• Storage	-40 ... +70 °C (-40 ... +158 °F)
Mechanical load (vibration)	
Compact version	18 ... 1000 Hz, 3.17 g RMS, sinusoidal in all directions to IEC 68-2-36
19" insert	1 ... 800 Hz, 1 g, sinusoidal in all directions to IEC 68-2-36
Degree of protection	
Compact version	IP67/NEMA 4X/6 to IEC 529 and DIN 40050 (1 mH ₂ O 30 min.)
19" insert	IP20/NEMA 1 to IEC 529 and DIN 40050
EMC performance	
	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5

Display and keypad	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Time constant	Time constant as current output time constant
Design	
Enclosure material	Fiber glass reinforced polyamide; stainless steel AISI 316/1.4436 (IP65)
• Compact version	
• 19" insert	Standard 19" insert of aluminum/steel (DIN 41494), width: 21 TE, height: 3 HE
• Back of panel	IP20/NEMA 1; Aluminum
• Panel mounting	IP20/NEMA 1 (prepared for IP65/NEMA 2 display side); ABS plastic
• Wall mounting	IP66/NEMA 4X; ABS plastic
Dimensions	
Compact version	See dimensional drawings
19" insert	See dimensional drawings
Weight	
Compact version	0.75 kg (2 lb)
19" insert	See dimensional drawings
Power supply	
	<ul style="list-style-type: none"> 115 ... 230 V AC +10 % -15 %, 50 ... 60 Hz 11 ... 30 V DC or 11 ... 24 V AC
Power consumption	
	<ul style="list-style-type: none"> 230 V AC: 17 VA 24 V AC: 9 VA, $I_N = 380 \text{ mA}$, $I_{ST} = 8 \text{ A}$ (30 ms) 12 V DC: 11 W, $I_N = 920 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (250 ms) 24 V DC: 8.4 VA, $I_N = 350 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (10 ms)
	$I_{ST} = 4 \text{ A}$ (250 ms): For solar panel please secure stable current supply
Certificates and approvals	
	CE, C-UL general purpose, C-tick; FM Class I, Div 2, CSA Class I, Div 2
Custody transfer approval (MAG 5000/6000 CT)	<ul style="list-style-type: none"> Cold water: MI-001, PTB/OIML R 49 (pattern approval DE/DK) Hot water: PTB and DANAK (MAG 6000 CT) Chilled water: PTB K 7.2; OE12/C 040 Other media than water (milk, beer etc.): PTB and DANAK OIML R 117 (pattern approval DE/DK) (MAG 6000 CT)
Communication	
Standard	Without serial communication or HART as option
• MAG 5000	
• MAG 6000	Prepared for client-mounted add-on modules
Optional (MAG 6000 only)	HART, Modbus RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules
• MAG 5000/6000 CT	No communication modules approved

Safety barrier (e/ia)


Application	For use with MAG 5000/6000 19" and MAG 1100 Ex ATEX/MAG 3100 Ex ATEX		
Ex approval	MAG 1100 Ex [EEx e ia] IIB ATEX MAG 3100 Ex [EEx e ia] IIC ATEX		
Cable parameter	Group	Capacity in μF	Inductance in mH
Electrode	IIC	≤ 4.1	≤ 80
	IIB	≤ 45	≤ 87
	IIA	≤ 45	≤ 87
Ambient temperature			
• During operation	-20 ... +50 °C (-4 ... +122 °F)		
• During storage	-20 ... +70 °C (-4 ... +158 °F)		
Enclosure			
• Material	Standard 19" insert in aluminum/steel (DIN 41494)		
• Width	21 TE (4.75")		
• Height	3 HE (5.25")		
• Rating	IP20 / NEMA 1 to EN 60529		
• Mechanical load	1 g, 1 ... 800 Hz sinusoidal in all directions to EN 60068-2-36		





Flow Measurement


SITRANS F M

Transmitter MAG 5000/6000







Selection and Ordering data





Transmitter MAG 5000

Description	Article No.	
Transmitter MAG 5000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6910-1AA30-0AA0 • 7ME6910-1AA10-0AA0 	
Transmitter MAG 5000 Display for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz • 115 ... 230 V AC, 50/60 Hz, with HART 	<ul style="list-style-type: none"> • 7ME6910-1AA30-1AA0 • 7ME6910-1AA10-1AA0 • 7ME6910-1AA10-1BA0 	
Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer (only with approval marks, no verification – only a complete flowmeter can be verified, i.e. sensor together with the transmitter); IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6910-1AA30-1AB0 • 7ME6910-1AA10-1AB0 	
Transmitter MAG 5000 for 19" rack and wall mounting <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6910-2CA30-1AA0 • 7ME6910-2CA10-1AA0 	

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Transmitter MAG 6000

Description	Article No.	
Transmitter MAG 6000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AA30-0AA0 • 7ME6920-1AA10-0AA0 	
Transmitter MAG 6000 for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AA30-1AA0 • 7ME6920-1AA10-1AA0 	
Transmitter MAG 6000 for compact and wall mounting; IP65/NEMA 4, stainless steel AISI 316/1.4436 (only for sensor with SS terminal box) (for remote installation order SS terminal box separately) <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1QA30-1AA0 • 7ME6920-1QA10-1AA0 	
Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer (no communication modules possible; only with approval marks, no verification – only a complete flowmeter can be verified, i.e. sensor together with the transmitter); IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AA30-1AB0 • 7ME6920-1AA10-1AB0 	
Transmitter MAG 6000 SV for compact and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1" IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AB30-1AA0 • 7ME6920-1AB10-1AA0 	
Transmitter MAG 6000 for 19" rack and wall mounting <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-2CA30-1AA0 • 7ME6920-2CA10-1AA0 	

Description	Article No.	
Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1" <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	7ME6920-2CB30-1AA0	
MAG 6000 with IP66/NEMA 4X enclosure; 115 ... 230 V AC, 50/60 Hz; cable gland PG13.5	7ME6920-2EA10-1AA0	
MAG 6000 with safety barrier for Ex-approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure, ATEX, 115 ... 230 V AC, 50/60 Hz; cable gland PG13.5 <ul style="list-style-type: none"> • For ATEX 2G D sensors 	7ME6920-2MA11-1AA0	
MAG 6000 SV, 19" insert, in IP66/NEMA 4X, ABS plastic enclosure, excitation frequency 44 Hz for Batch application DN ≤ 25/1"; cable gland PG13.5 <ul style="list-style-type: none"> • 11 ... 30 V DC, 11 ... 24 V AC, 50/60 Hz • 115 ... 230 V AC, 50/60 Hz 	7ME6920-2EB30-1AA0 7ME6920-2EB10-1AA0	

- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.


Operating instructions for SITRANS F M MAG 5000/6000

Description	Article No.	
For SITRANS F M MAG 5000/6000 IP67 <ul style="list-style-type: none"> • English • German • Spanish • French 	A5E02338368 A5E02944982 A5E02944995 A5E02944990	
For SITRANS F M MAG 5000/6000 19" <ul style="list-style-type: none"> • English 	A5E02082880	

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Communication modules for MAG 6000




Description	Article No.	
HART (not for MAG 6000 I)	◆ FDK:085U0226	
Modbus RTU/RS 485	◆ FDK:085U0234	
PROFIBUS PA Profile 3	◆ FDK:085U0236	
PROFIBUS DP Profile 3	◆ FDK:085U0237	
DeviceNet	◆ FDK:085U0229	
FOUNDATION Fieldbus H1	A5E02054250	

Operating instructions for SITRANS F add-on modules

Description	Article No.	
HART <ul style="list-style-type: none"> • English 	A5E03089708	
PROFIBUS PA/DP <ul style="list-style-type: none"> • English • German 	A5E00726137 A5E01026429	
Modbus <ul style="list-style-type: none"> • English • German • Spanish • French 	A5E00753974 A5E03089262 A5E03089278 A5E03089265	
FOUNDATION Fieldbus <ul style="list-style-type: none"> • English • German • Spanish • French 	A5E02318728 A5E02488856 A5E02512177 A5E02512169	
DeviceNet <ul style="list-style-type: none"> • English 	A5E03089720	

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

Accessories for MAG 5000 and MAG 6000

Description	Article No.	
Wall mounting unit for IP67/ NEMA 4X/6 version, wall bracket, terminal box in polyamide ¹⁾ <ul style="list-style-type: none"> • 4 x M20 cable glands • 4 x 1/2" NPT cable glands 	FDK:085U1018 FDK:085U1053	
Sun lid for MAG 5000/6000 transmitter (Frame and lid)	A5E02328485	
Cable for standard electrode or coil, 3 x 1.5 mm ² / 18 gage with shield PVC; Temperature range: -30 ... +70 °C (-22 ... +158 °F) <ul style="list-style-type: none"> • 10 m (33 ft) • 20 m (65 ft) • 40 m (130 ft) • 60 m (200 ft) • 100 m (330 ft) • 150 m (500 ft) • 200 m (650 ft) • 500 m (1650 ft) 	FDK:083F0121 FDK:083F0210 FDK:083F0211 FDK:083F0212 FDK:083F0213 FDK:083F3052 FDK:083F3053 FDK:083F3054	



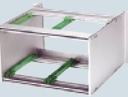









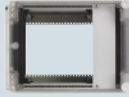

- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

1) For stainless steel wall mounting kit, order:
 - M20: FDK:085U1018 and A5E00836867
 - 1/2 NPT: FDK:085U1053 and A5E00836868

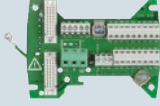


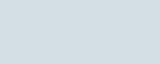


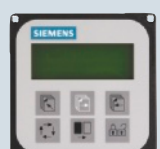
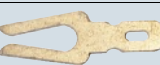
Flow Measurement





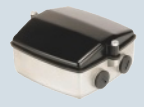


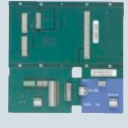
SITRANS F M

Transmitter MAG 5000/6000

Description	Article No.		Description	Article No.	
Electrode cable for empty pipe or low conductivity ¹⁾ , double shielded, 3 x 0.25 mm ² . Temperature range : -30 ... +70 °C (-22 ... +158 °F)			Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 1 enclosure in aluminum	FDK:083F5032	
• 10 m (33 ft) ◆ FDK:083F3020			Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminum	FDK:083F5033	
• 20 m (65 ft) ◆ FDK:083F3095			IP66/NEMA 4X, wall mounting enclosure for 19" inserts (without back plates). Use with PCB A5E02559813 or A5E02559814. Cable glands (FDK:083G0288) not included		
• 40 m (130 ft) FDK:083F3094			• 21 TE FDK:083F5037		
• 60 m (200 ft) FDK:083F3093			• 42 TE FDK:083F5038		
• 100 m (330 ft) FDK:083F3092			Front cover (7TE) for panel mounting enclosure	FDK:083F4525	
• 150 m (500 ft) FDK:083F3056			Sun shield for remote MAG 5000/6000 transmitters	A5E01209496	
• 200 m (650 ft) FDK:083F3057			Sun Shield for compact MAG 5000/6000 transmitters on MAG 3100 (DN 15 ... 2000 (1/2" ... 78") or MAG 5100 W (DN 150 ... 1200 (6" ... 48"))	A5E01209500	
• 500 m (1650 ft) FDK:083F3058			◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.		
Low-noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm ²			◆ Special cables cannot be used with 19" safety barrier		
• 2 m (6.6 ft) A5E02272692					
• 5 m (16.5 ft) A5E02272723					
• 10 m (33 ft) A5E02272730					
Cable kit with standard coil cable ¹⁾ , 3 x 1.5 mm ² /18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm ² . Temperature range: -30 ... +70 °C (-22 ... +158 °F)					
• 5 m (16.5 ft) ◆ A5E02296329					
• 10 m (33 ft) ◆ A5E01181647					
• 15 m (49 ft) ◆ A5E02296464					
• 20 m (65 ft) ◆ A5E01181656					
• 25 m (82 ft) ◆ A5E02296490					
• 30 m (98 ft) ◆ A5E02296494					
• 40 m (130 ft) ◆ A5E01181686					
• 50 m (164 ft) ◆ A5E02296498					
• 60 m (200 ft) A5E01181689					
• 100 m (330 ft) A5E01181691					
• 150 m (500 ft) A5E01181699					
• 200 m (650 ft) A5E01181703					
• 500 m (1650 ft) A5E01181705					
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220				
19" safety barrier (21 TE) ¹⁾ [EEx e ia] IIC for MAG 1100 Ex sensors and MAG 3100 Ex sensors 12 ... 24 V, 115 ... 230 V, incl. back plate (A5E02559810)	FDK:083F5034				
Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	FDK:083F5030				
Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	FDK:083F5031				

Spare parts

Description	Article No.	
Connection board (for polyamide terminalbox) <ul style="list-style-type: none"> • 12 ... 24 V • 115 ... 230 V 	A5E02559817 A5E02559816	
Connection board (for stainless steel terminal-box) <ul style="list-style-type: none"> • 12 ... 24 V • 115 ... 230 V 	A5E02604280 A5E02604272	
19" enclosure, 12 ... 24 V, 115 ... 230 V <ul style="list-style-type: none"> • Connection board for standard 19" transmitter 	A5E02559809	
<ul style="list-style-type: none"> • Connection board for transmitter ia and safety barrier 	A5E02559810	
<ul style="list-style-type: none"> • Connection board for transmitter ia/ib and safety barrier (only for sensors produced before October 2007) 	A5E02559811	
<ul style="list-style-type: none"> • Connection board for transmitter and cleaning unit 	FDK:083F4123	
SENSORPROM memory unit (Sensor code and serial numbers must be specified on order) <ul style="list-style-type: none"> • 2 kB (for MAG 5000/6000/ MAG 6000 I) - 1 pc. - 10 pcs. • 250 B (for MAG 2500/3000) 	FDK:085U1005 FDK:083F5052 FDK:085U1008	
Display unit for MAG 5000/6000 <ul style="list-style-type: none"> • Black neutral front 	FDK:085U1038	
<ul style="list-style-type: none"> • Siemens front 	FDK:085U1039	
HW key	On request	

Description	Article No.	
Cable glands, for above cable, 4 pcs. <ul style="list-style-type: none"> • M20 • ½" NPT • PG 13.5, 2 pcs. 	A5E00822490 A5E00822501 FDK:083G0228	
Sealing screws for sensor/transmitter, 2 pcs	FDK:085U0221	
Terminal box, in polyamide, inclusive lid, terminal blocks, gasket and screws <ul style="list-style-type: none"> • M20 • ½" NPT 	FDK:085U1050 FDK:085U1052	
Terminal box lid, in polyamide	FDK:085U1003	
Terminal box, in stainless steel, inclusive lid, terminal blocks, gasket and screws, for MAG 6000 in stainless steel and for all Ex sensors, <ul style="list-style-type: none"> • M20 • ½" NPT 	A5E00836867 A5E00836868	
Terminal box (3A) for MAG 1100 F in polyamide, inclusive lid, terminal blocks, gasket and screws <ul style="list-style-type: none"> • M20 • ½" NPT 	A5E00822478 A5E00822479	
Wall unit enclosure IP66, 12 ... 24 V, 115 ... 230 V <ul style="list-style-type: none"> • PCB for standard transmitter 	A5E02559813	
<ul style="list-style-type: none"> • PCB for transmitter ia/e and safety barrier 	A5E02559814	
<ul style="list-style-type: none"> • PCB for transmitter ia/ib and safety barrier (7ME6130, 7ME6150 and 7ME6330) 	A5E02559812	
<ul style="list-style-type: none"> • PCB for transmitter and cleaning unit 	A5E02559815	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

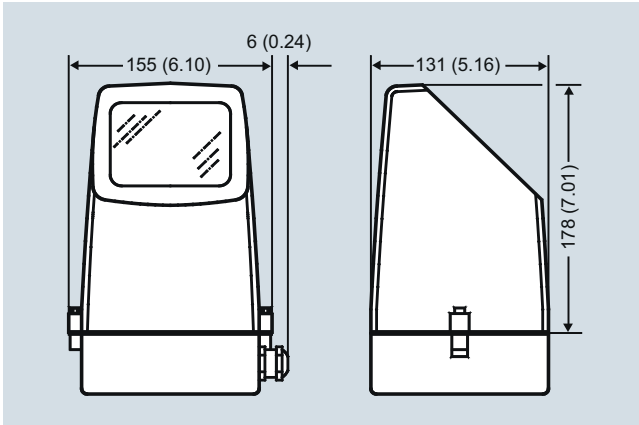
Flow Measurement

SITRANS F M

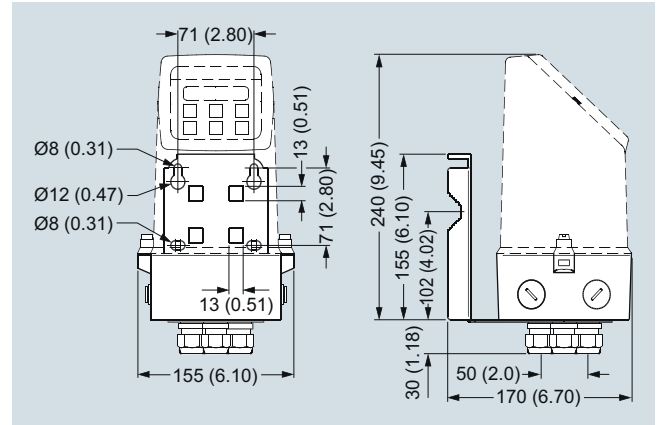
Transmitter MAG 5000/6000

Dimensional drawings

Transmitter IP67/NEMA 4X/6 compact polyamide

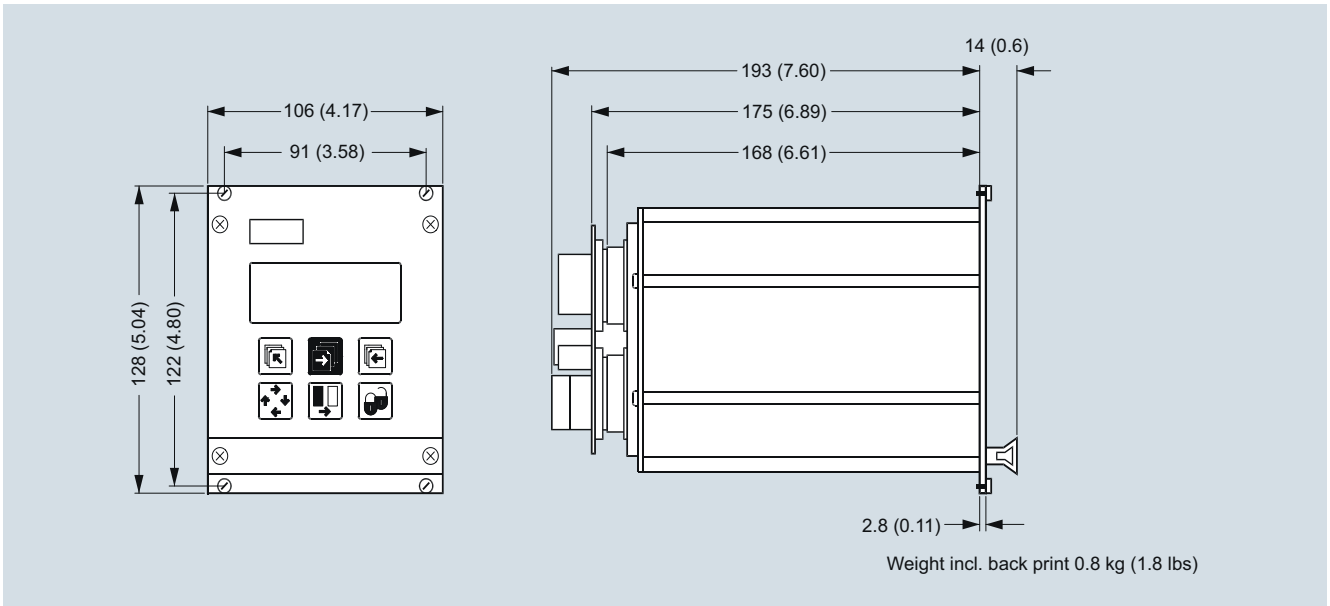


Transmitter compact mounted, dimensions in mm (inch)



Transmitter wall mounted, dimensions in mm (inch)

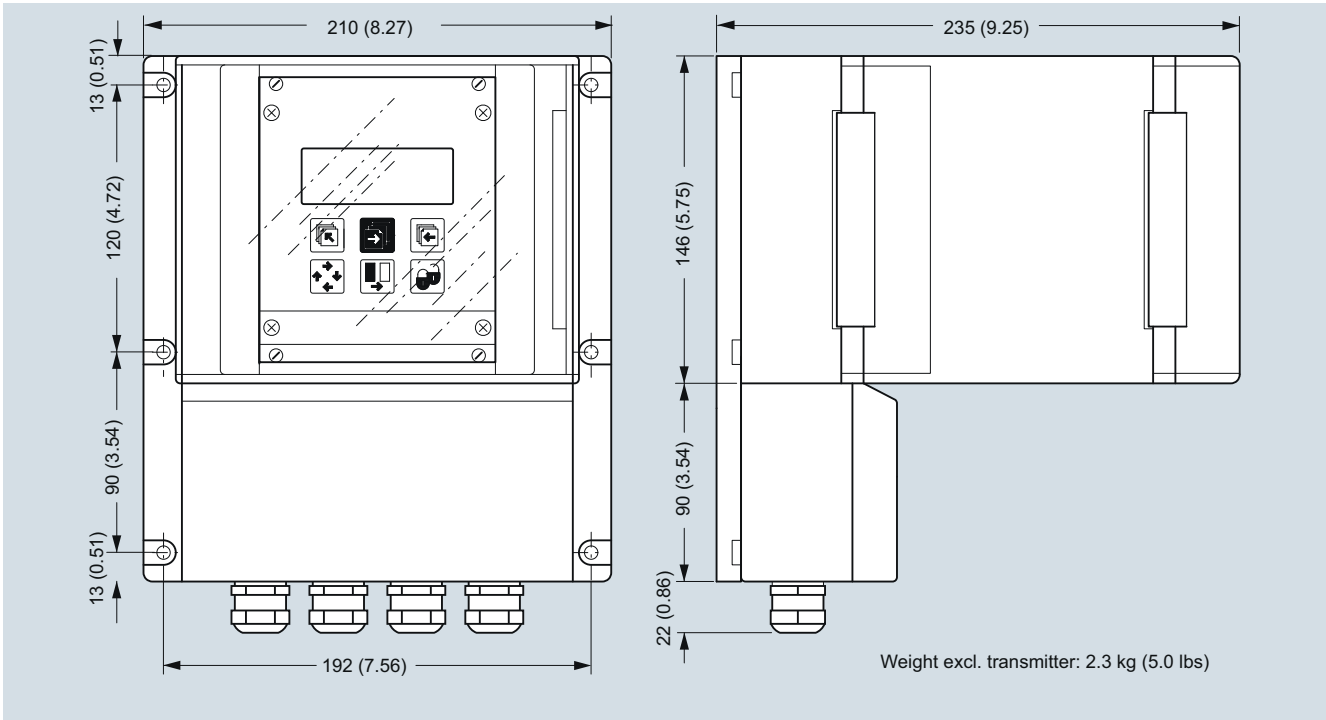
Transmitter, 19" IP20/NEMA 1 standard unit



Dimensions in mm (inch)

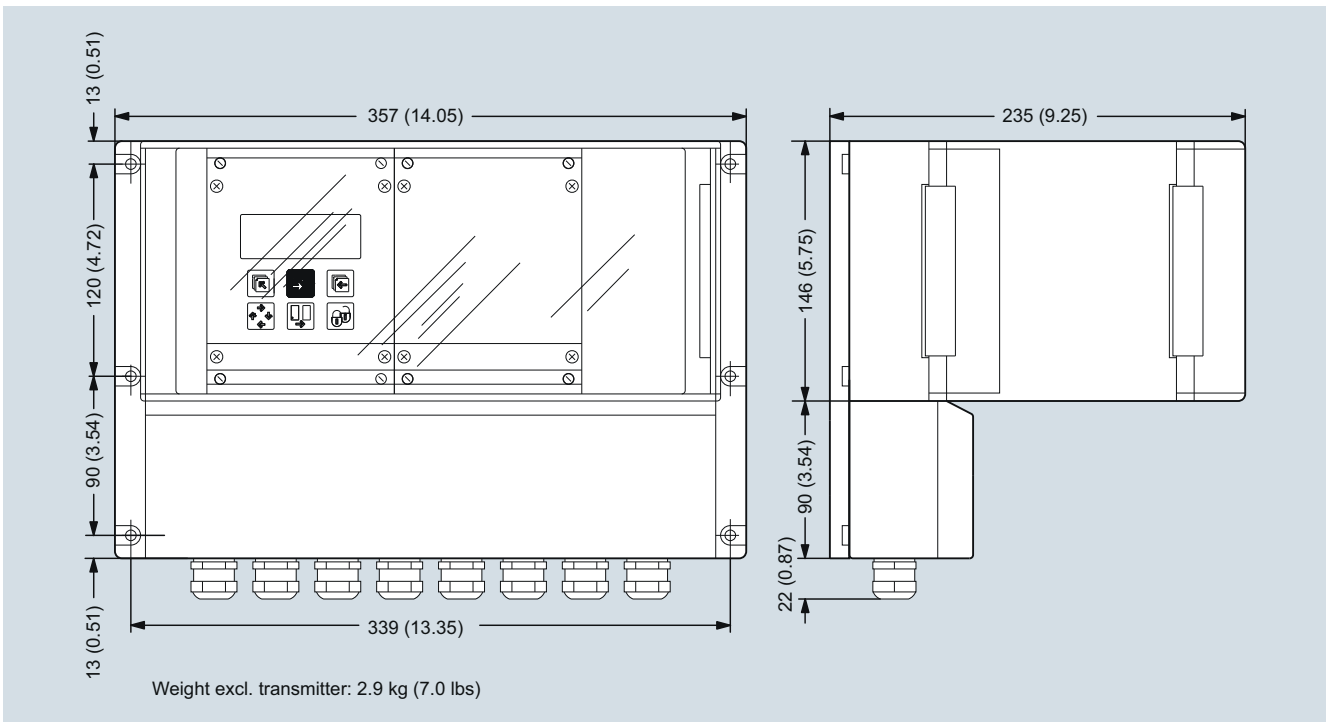
3

Transmitter, wall mounting IP66/NEMA 4X, 21 TE



Dimensions in mm (inch)

Transmitter, wall mounting IP66/NEMA 4X, 42 TE



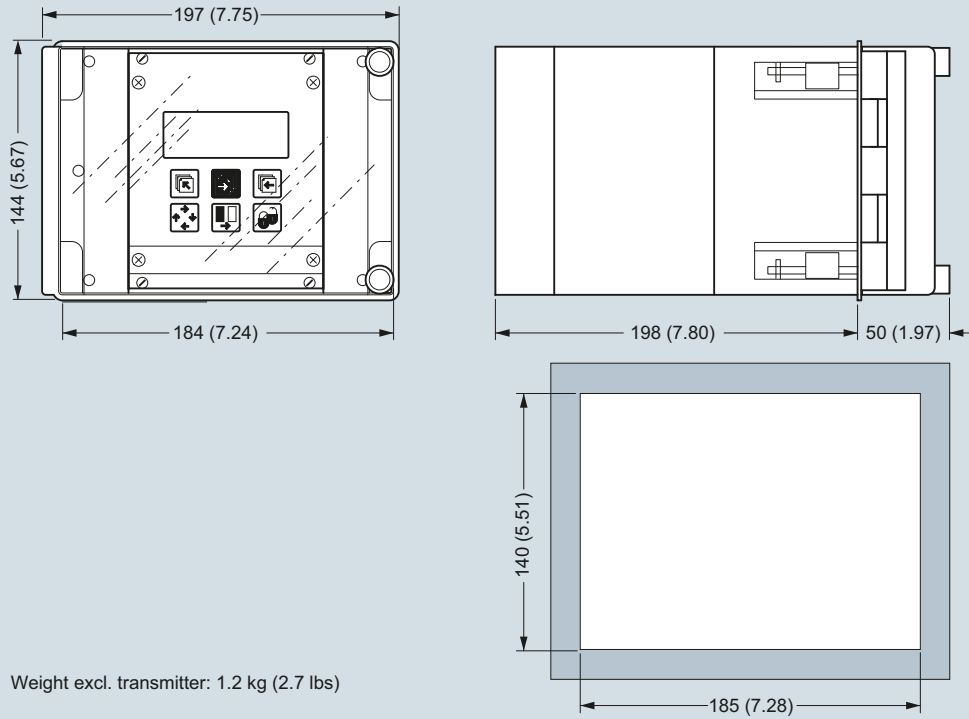
Dimensions in mm (inch)

Flow Measurement

SITRANS F M

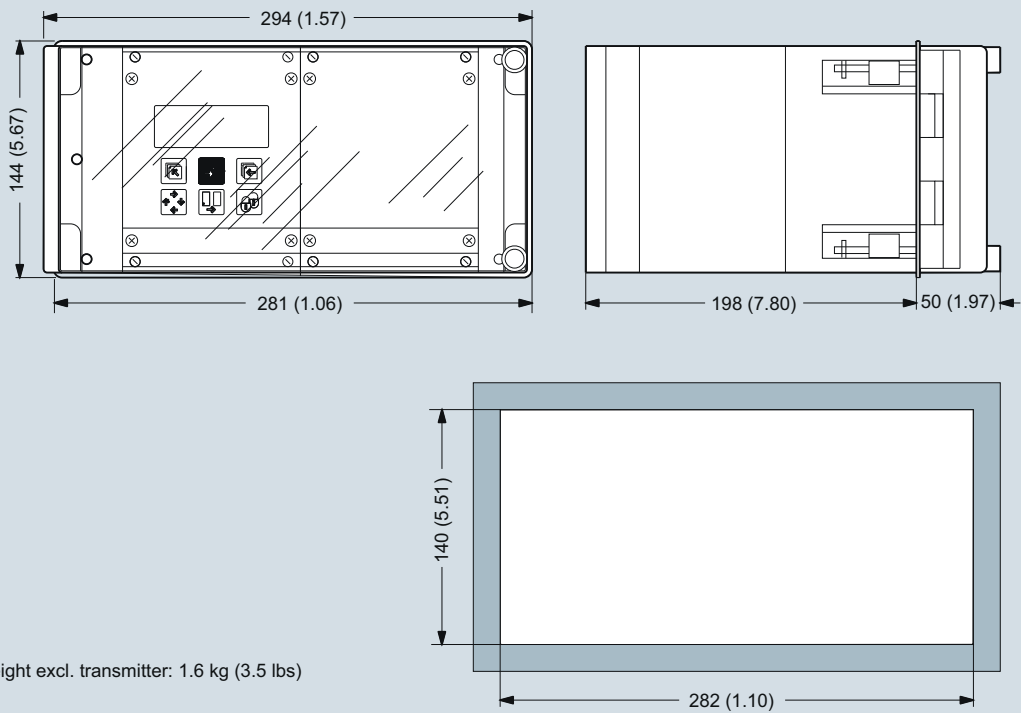
Transmitter MAG 5000/6000

Transmitter, panel front IP20/NEMA 1, 21 TE



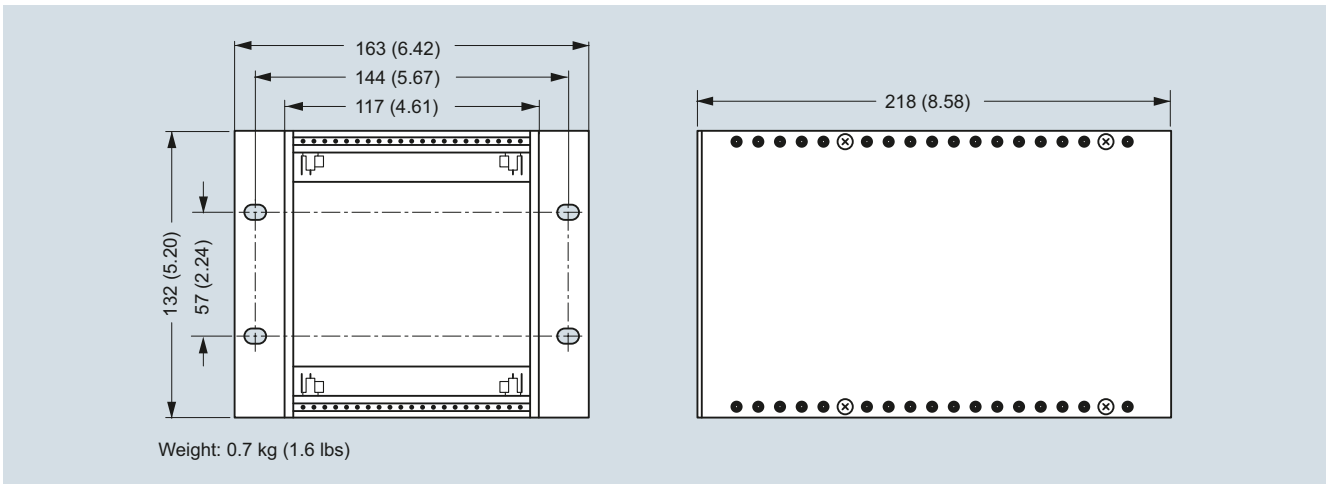
Dimensions in mm (inch)

Transmitter, panel front IP20/NEMA 1, 42 TE



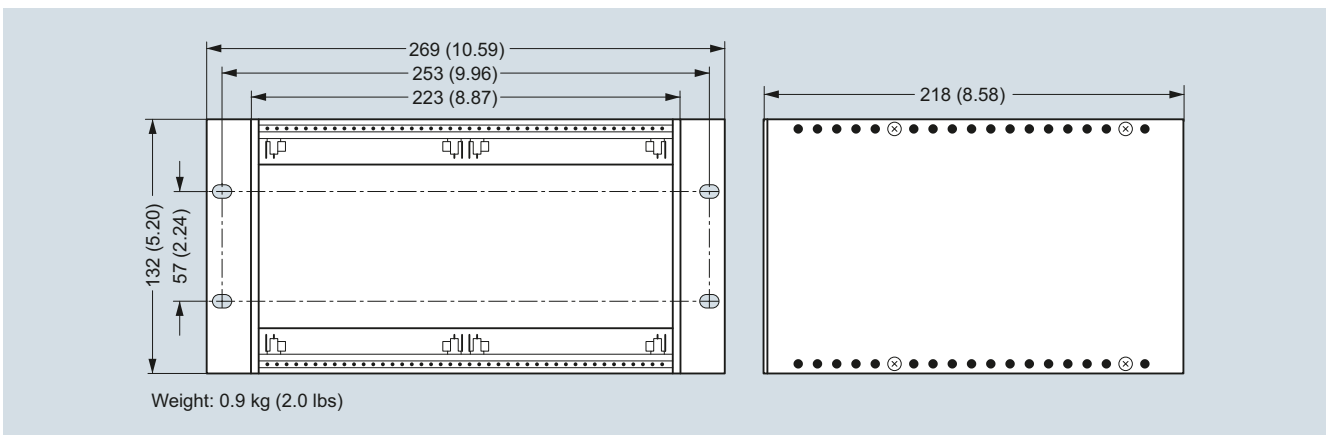
Dimensions in mm (inch)

Transmitter, back of panel IP20/NEMA 1, 21 TE



Dimensions in mm (inch)

Transmitter, back of panel IP20/NEMA 1, 42 TE



Dimensions in mm (inch)

Flow Measurement

SITRANS F M

Transmitter MAG 5000/6000

Schematics

Electrical connection

Grounding

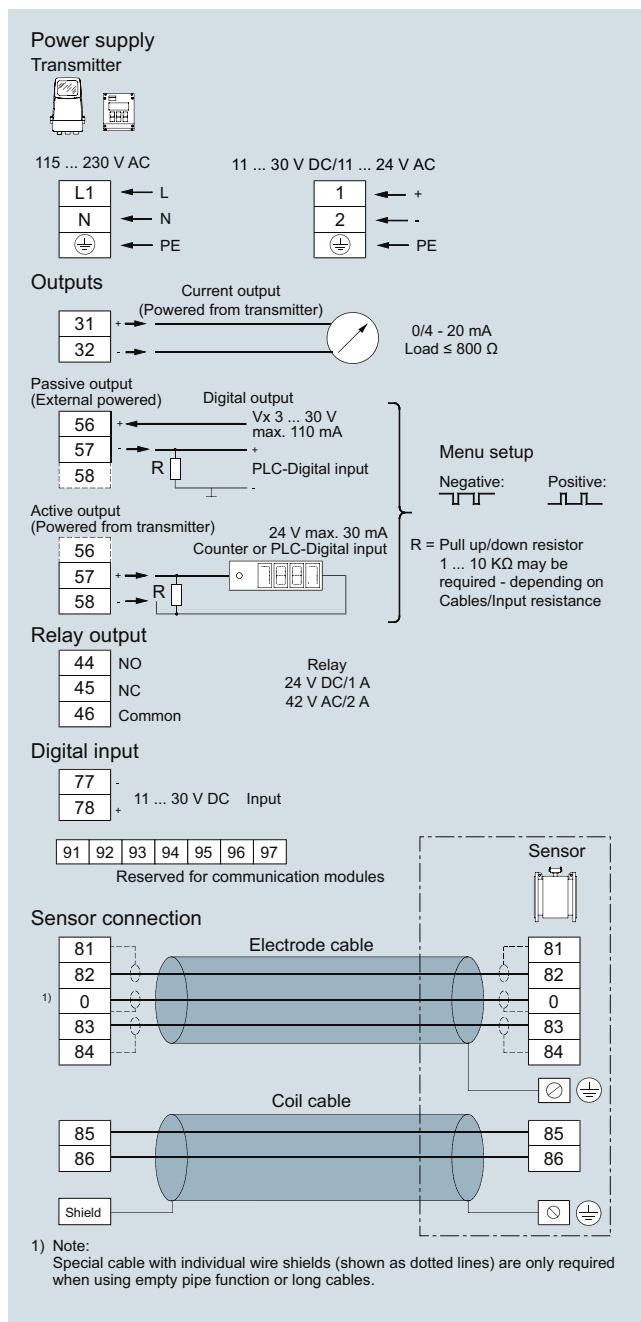
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 μ F capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If the output cable length is long in noisy environment, we recommend to use shielded cable.



Overview

The SITRANS F M MAG 6000 I/MAG 6000 I Ex transmitter is designed for the demands in the process industry. The robust die cast aluminum housing provides superb protection, even in the most harsh industrial environments. Full input and output functionality is given even in the Ex version.

Benefits

- Full range of Ex-rated flowmeters with intrinsically safe rated input and outputs
- For compact or remote installation
- HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA and DP, Modbus RTU/RS 485 add-on communication modules available
- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Flow rate in various units
 - Totalizer for forward, reverse and net flow as well as much more information available.
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging
- Batch control
- MAG 6000 I NAMUR: compliant with NAMUR NE 21, NE 32, NE 43, NE 53 and NE 70

Design

The transmitter is designed for either compact or remote installation in non-hazardous or hazardous areas (compact mounted transmitter to be ordered together with the sensors).

Function

The following functions are available:

- Flow rate
- 2 measuring ranges
- 2 totalizers
- Low flow cut-off
- Flow direction
- Error system
- Operating time
- Uni-/bidirectional flow

- Limit switches and pulse output
- Batch control

The MAG 6000 I/6000 I Ex is a microprocessor-based transmitter with a built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

Displays and keypads

Operation of the transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or Modbus communication

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	$> 1 \times 10^{14} \Omega$
Input	
Digital input	11 ... 30 V DC, $R_i = 4.4 \text{ k}\Omega$
• Activation time	50 ms
• Current	$I_{11 \text{ V DC}} = 2.5 \text{ mA}$, $I_{30 \text{ V DC}} = 7 \text{ mA}$
Output	
Current output	
• Signal range	4 ... 20 mA (active/ passive)
• Load	$< 560 \Omega$
• Time constant	0.1 ... 30 s, adjustable
Digital output	
• Frequency	0 ... 10 kHz, 50 % duty cycle (uni-/bidirectional)
• Time constant	0.1 ... 30 s, adjustable
• Pulse (passive)	3 ... 30 V DC, max 110 mA (30 mA Ex version), $200 \Omega \leq R_i \leq 10 \text{ k}\Omega$ (powered from connected equipment)
• Time constant	0.1 ... 30 s, adjustable
Relay output	
• Time constant	Changeover relay, same as current output
• Load	42 V AC/2 A, 24 V DC/1 A
Low flow cut off	0 ... 9.9 % of maximum flow
Galvanic isolation	All inputs and outputs are galvanic isolated
Max. measuring error	
MAG 6000 I/MAG 6000 I Ex (incl. sensor)	$\pm 0.2 \% \pm 1 \text{ mm/s}$

Flow Measurement

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex

Rated operation conditions	
Ambient temperature	
• Operation	
- MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)
- MAG 6000 I Ex	-20 ... +60 °C (14 ... 140 °F)
• Storage	-40 ... +70 °C (-40 ... +158 °F)
Mechanical load	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Transmitter: 1.14 g RMS
Degree of protection	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O 30 min.)
EMC performance	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5 NAMUR NE 21

Display and keypad	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Keypad	Capacitive touch keypad with LED light for feedback indication
Time constant	Time constant as current output time constant

Design	
Enclosure material	Die cast aluminum, with corrosion resistant Basic Polyester powder coating (min. 60 µm)
• Wall mounting	Wall mounting bracket enclosed for remote version
Dimensions	See dimensional drawings
Weight	See dimensional drawings

Power supply	
Power consumption	<ul style="list-style-type: none"> Standard transmitter: 18 ... 90 V DC; 115 ... 230 V AC +10 %/-15 %; 50 ... 60 Hz Ex transmitter: 18 ... 30 V DC Ex transmitter: 115 ... 230 V AC; 50 ... 60 Hz Ex transmitter NAMUR: 18 ... 30 V DC; 115 ... 230 V AC; 50 ... 60 Hz
	<ul style="list-style-type: none"> 230 V AC: 20 VA 24 V DC: 9.6 W, I_N = 0.4 A, I_{ST} = 1 A (3 ms)

Certificates and approvals	
MAG 6000 I	<ul style="list-style-type: none"> CE C-tick FM Class I, Div 2 FM Class I, Zone 2 CSA Class I, Div 2
MAG 6000 I Ex	<ul style="list-style-type: none"> IEC Ex de [ia] [ib] ia IIC T6 Gb Ex tDa 21 IP67 ATEX II 2(1)(2) GD EEx de [ia] ia [ib] IIC T6 FM Class I, Div 1¹⁾ FM Class I, Zone 1 CSA Class I, Zone 1/21

Cable entries	
MAG 6000 I	Remote installation 2 x M25 (for supply/output) and 2 x M16 (for sensor connection) or 2 x ½" NPT (for supply/output) and 2 x M16 (for sensor connection)
MAG 6000 I Ex ATEX 2G D	2 x M20 (for supply/output) and 2 x M16 (for sensor connection)

Communication	
Standard versions	HART, Modbus RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP add-on modules
Ex versions	HART, PROFIBUS PA,

¹⁾ Applicable for: Compact mounted MAG 6000 I Ex on MAG 3100 (sizes DN 15 ... DN 300 (½" ... 12"))

Selection and Ordering data	Article No.
SITRANS F M Transmitter MAG 6000 I/Ex	7ME6930-
Remote with standard wall mounting bracket, local display, die cast aluminum	2BA - 1 AA
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Supply voltage	
Standard transmitter: 18 ... 90 V DC; 115 ... 230 V AC, 50 ... 60 Hz	2
Standard transmitter (NAMUR): 18 ... 30 V DC; 115 ... 230 V AC, 50 ... 60 Hz	3
Ex transmitter: 18 ... 30 V DC	4
Ex transmitter: 115 ... 230 V AC, 50 ... 60 Hz	5
Ex transmitter (NAMUR): 18 ... 30 V DC; 115 ... 230 V AC, 50 ... 60 Hz	6
Ex approval	
Standard sensor: FM Class I, Div 2, CSA Class I, Div 2	0
Ex sensor: Hazardous area (ATEX 2G D; FM Class I, Zone 1; CSA Class I, Zone 1)	2
Communication	
None	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3 (not for Ex version)	G
Modbus RTU/RS 485 (not for Ex version)	E
FOUNDATION Fieldbus H1	J
Cable gland entries	
Metric	0
½" NPT	2

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further design	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Other, post-production requirements (add plain text)	Y99

Operating instructions for SITRANS F M MAG 6000 I

Description	Article No.
• English	A5E02083319
• German	A5E02210835
• French	A5E02342413

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Communication modules for MAG 6000 I
(All standard outputs can still be used)

Description	Article No.
HART (only for MAG 6000 I/Ex)	◆ FDK:085U0321
Modbus RTU/RS 485 ¹⁾	◆ FDK:085U0234
PROFIBUS PA Profile 3	◆ FDK:085U0236
PROFIBUS DP Profile 3 ¹⁾	◆ FDK:085U0237
DeviceNet ¹⁾	◆ FDK:085U0229
FOUNDATION Fieldbus H1 ¹⁾	A5E02054250



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

¹⁾ Not for Ex versions

Operating instructions for SITRANS F add-on modules

Description	Article No.
HART, English	A5E03089708
PROFIBUS PA/DP	
• English	A5E00726137
• German	A5E01026429
Modbus	
• English	A5E00753974
• German	A5E03089262
• Spanish	A5E03089278
• French	A5E03089265
FOUNDATION Fieldbus	
• English	A5E02318728
• German	A5E02488856
• Spanish	A5E02512177
• French	A5E02512169
DeviceNet, English	A5E03089720

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

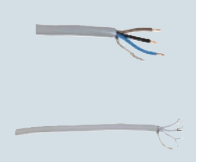
Accessories MAG 6000 I/MAG 6000 I Ex

Description	Article No.
Cable for standard electrode or coil, 3 x 1.5 mm ² /18 gage with shield PVC. Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 10 m (33 ft)	◆ FDK:083F0121
• 20 m (65 ft)	◆ FDK:083F0210
• 40 m (130 ft)	◆ FDK:083F0211
• 60 m (200 ft)	◆ FDK:083F0212
• 100 m (330 ft)	FDK:083F0213
• 150 m (500 ft)	FDK:083F3052
• 200 m (650 ft)	FDK:083F3053
• 500 m (1650 ft)	FDK:083F3054
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm ² . Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 10 m (33 ft)	◆ FDK:083F3020
• 20 m (65 ft)	◆ FDK:083F3095
• 40 m (130 ft)	FDK:083F3094
• 60 m (200 ft)	FDK:083F3093
• 100 m (330 ft)	FDK:083F3092
• 150 m (500 ft)	FDK:083F3056
• 200 m (650 ft)	FDK:083F3057
• 500 m (1650 ft)	FDK:083F3058



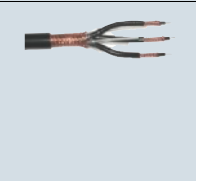
Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²

- 5 m (16.5 ft) ◆ **A5E02296329**
- 10 m (33 ft) ◆ **A5E01181647**
- 15 m (49 ft) ◆ **A5E02296464**
- 20 m (65 ft) ◆ **A5E01181656**
- 25 m (82 ft) ◆ **A5E02296490**
- 30 m (98 ft) ◆ **A5E02296494**
- 40 m (130 ft) ◆ **A5E01181686**
- 50 m (164 ft) ◆ **A5E02296498**
- 60 m (200 ft) **A5E01181689**
- 100 m (330 ft) **A5E01181691**
- 150 m (500 ft) **A5E01181699**
- 200 m (650 ft) **A5E01181703**
- 500 m (1650 ft) **A5E01181705**



Low noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm²

- 2 m (6.6 ft) **A5E02272692**
- 5 m (16.5 ft) **A5E02272723**
- 10 m (33 ft) **A5E02272730**



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Spare parts



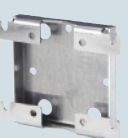
Description	Article No.
MAG 6000 I Display	FDK:085U3122
Accessory bag including cable gland inserts coil and electrode connectors	FDK:085U3144
Electronics cover with Ex glass plate. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	7ME5933-0AC01
Cover for connection board incl. gasket (for remote version). Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	7ME5933-0AC02
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	7ME5933-0AC03



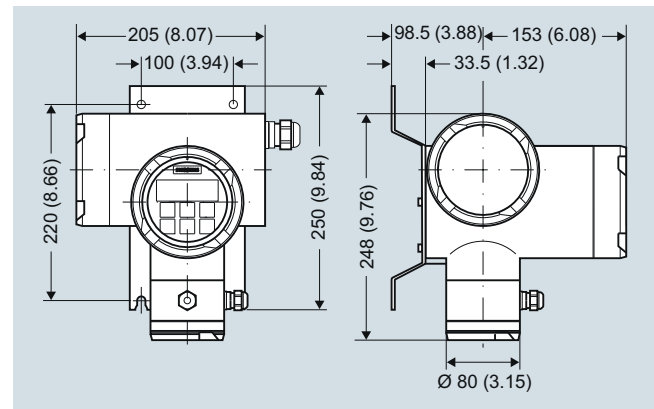
Flow Measurement

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex


Description	Article No.	
Safety clamp	7ME5933-0AC06	
Standard wall mounting bracket. Steel AISI 316L/EN10088-2-1.4404	7ME5933-0AC04	
Wall-/pipe mounting bracket kit, BI 2.5 DIN59382 X6Cr17	7ME5933-0AC05	

Dimensional drawings



Dimensions in mm (inch), weight: 6 kg (13.5 lb)

Complete spare part PCB unit

Description	Article No.	
MAG 6000 I PCBA (not for Ex)	FDK:085U3123	
MAG 6000 I std. (NAMUR), 18 ... 30 V DC; 115 ... 230 V AC Spare PCBA unit	A5E31426892	
MAG 6000 I Ex (NAMUR), 18 ... 30 V DC; 115 ... 230 V AC Spare PCBA unit for use with Ex sensors with increased safety e (For Ex sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 > DN300)	A5E31426877¹⁾	

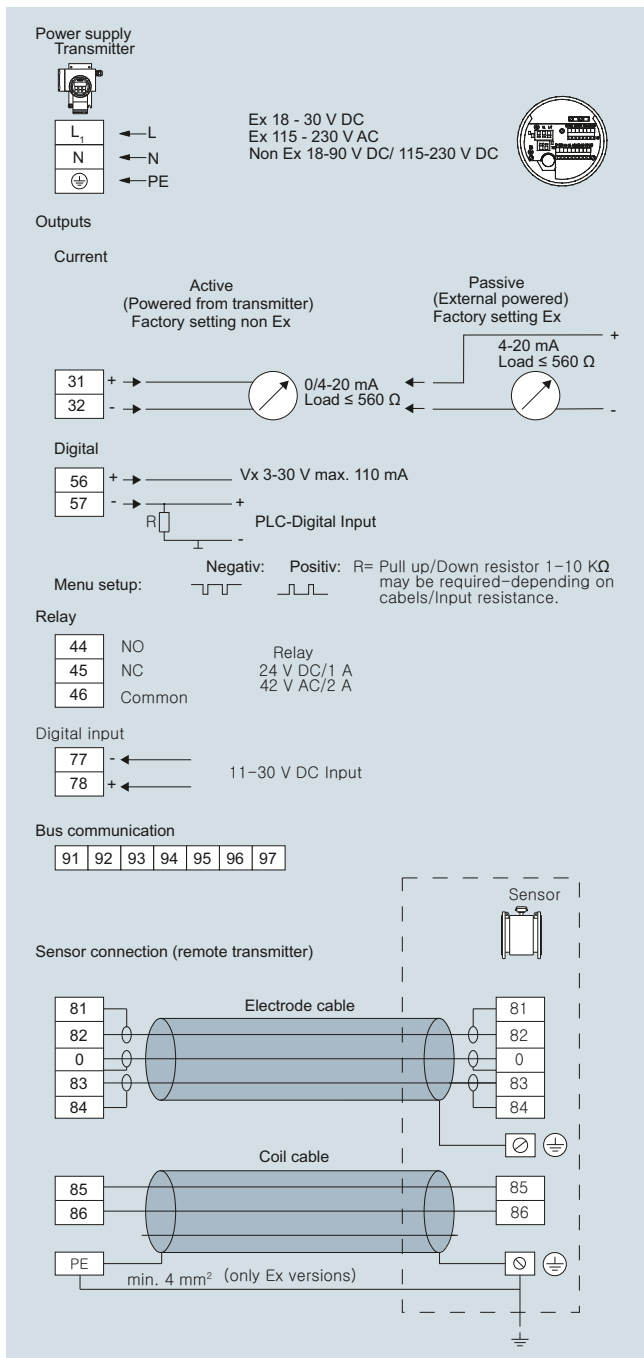
¹⁾ Ex spare parts may only be exchanged by "Siemens Ex Authorized personnel".

Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

Schematics



3

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Overview



The SITRANS F M MAG 1100 is an electromagnetic flow sensor in a compact wafer design designed for flow applications in the process industry.

Benefits

- Sensor sizes: DN 2 to 100 (1/12" to 4")
- Compact wafer design meets EN 1092, DIN and ANSI flange standards
- Corrosion resistant AISI 316 stainless steel sensor housing
- Highly resistant liner and electrodes fitting most extreme process media
- Temperature rating up to 200 °C (392 °F)
- Hose proof IP67/NEMA 4X enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Pharmaceutical industry
- Water treatment like e.g. chemical dosing

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Simple on site upgrade to IP68/NEMA 6P terminal box
- Ex ATEX 2G D version
- FM Class I, Div 2

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAG 5000, 6000 or 6000 I. The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS 485.

Technical specifications

Version	MAG 1100	MAG 1100 HT (High temperature)
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	DN 2 ... 65 (1/12" ... 2 1/2"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 Hz	DN 15 ... 50 (1/2" ... 2"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 Hz
Process connection		
Nominal size		
• MAG 1100 (Ceramic)	DN 2 ... DN 100 (1/12" ... 4")	DN 15 ... DN 100 (1/2" ... 4")
• MAG 1100 (PFA)	DN 10 ... DN 100 (3/8" ... 4")	
Mating flanges	EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent Option: DN 2 ... 10 (1/12" ... 3/8"): G 1/2" / NPT 1/2" pipe connection adapters	EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent
Rated operating conditions		
<u>Ambient conditions</u>		
Ambient temperature ¹⁾		
• Standard sensor	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)
• Ex sensor	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
• Compact transmitter MAG 5000/6000 ²⁾	-20 ... +60 °C (-4 ... +140 °F)	
• Compact transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)	
• Compact transmitter MAG 6000 I Ex	-20 ... +60 °C (-4 ... 140 °F)	
<u>Temperature of medium</u>		
• MAG 1100 (Ceramic)	-20 ... +150 °C (-4 ... +302 °F)	-20 ... +200 °C (-4 ... +392 °F)
• MAG 1100 Ex (Ceramic)	-20 ... +150 °C (-4 ... +302 °F)	-20 ... +180 °C (-4 ... +356 °F)
• MAG 1100 (PFA)	-30 ... +130 °C (-22 ... +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	
<u>Temperature shock</u>		
• MAG 1100 (Ceramic)		
- Duration ≤ 1 min, followed by 10 min rest	<ul style="list-style-type: none"> • DN 2, 3 (1/12", 1/8") No limitations • DN 6, 10, 15, 25: Max. ΔT ≤ 80 °C/min (1/4", 3/8", 1/2", 1": Max. ΔT ≤ 144 °F/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1 1/2", 2", 2 1/2": Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 108 °F/min) 	<ul style="list-style-type: none"> • DN 15, 25: Max. ΔT ≤ 80 °C/min (1/2", 1": Max. ΔT ≤ 144 °F/min) • DN 40, 50: Max. ΔT ≤ 70 °C/min (1 1/2", 2": Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 108 °F/min)
• MAG 1100 (PFA)	Max. ± 100 °C (212 °F) momentarily	
<u>Operating pressure</u>		
• MAG 1100 (Ceramic)	<ul style="list-style-type: none"> • DN 2 ... 65: 40 bar (1/12" ... 2 1/2"): 580 psi) • DN 80: 37.5 bar (3": 540 psi) • DN 100: 30 bar (4": 435 psi) Vacuum: 1 x 10 ⁻⁶ bar _{abs} (1.5 x 10 ⁻⁵ psi _{abs})	<ul style="list-style-type: none"> • DN 15 ... 50: 40 bar (1/2" ... 2"): 580 psi) • DN 80: 37.5 bar (3": 540 psi) • DN 100: 30 bar (4": 435 psi) Vacuum: 1 x 10 ⁻⁶ bar _{abs} (1.5 x 10 ⁻⁵ psi _{abs})
• MAG 1100 (PFA)	20 bar (290 psi) Vacuum: 0.02 bar _{abs} (0.3 psi _{abs}) DN 80 ... DN 100: CO ₂ pressure max. 7 bar (101.5 psi)	
<u>Mechanical load (vibration)</u>	<ul style="list-style-type: none"> • 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 g RMS • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS • For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part. 	<ul style="list-style-type: none"> • 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 g RMS
<u>Enclosure rating (standard)</u>	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min
EMC	2004/108/EC	2004/108/EC

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Version	MAG 1100	MAG 1100 HT (High temperature)
Design		
Weight	See Dimensional drawings	See Dimensional drawings
Material		
<ul style="list-style-type: none"> Enclosure <ul style="list-style-type: none"> MAG 1100 Terminal box <ul style="list-style-type: none"> Standard Option Fixing studs Gaskets <ul style="list-style-type: none"> Standard Option Pipe connection adapters: <ul style="list-style-type: none"> DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8") 	Stainless steel AISI 316L/1.4404 Fibre glass reinforced polyamide (not for Ex) Stainless steel AISI 316/1.4436 Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001 EPDM (max. 150 °C, PN 40 (max. 302 °F, 600 psi)) • Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi)) • PTFE (max. 130 °C, PN 25 (max. 266 °F, 300 psi)) • Stainless steel, AISI 316/1.4436 • Hastelloy C22/2.4602 • PVDF	Stainless steel AISI 316L/1.4404 Stainless steel AISI 316/1.4436 Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001 Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi))
Liner		
<ul style="list-style-type: none"> MAG 1100 (Ceramic) MAG 1100 (PFA) 	<ul style="list-style-type: none"> DN 2, 3 (1/12", 1/8"): Zirconium oxide (ZrO₂) (ceramic) DN 6 ... 100 (1/4" ... 4"): Aluminum oxide Al₂O₃ Reinforced PFA (not for Ex) 	DN 15 ... 100 (1/2" ... 4"): Aluminum oxide Al ₂ O ₃
Electrodes		
<ul style="list-style-type: none"> MAG 1100 (Ceramic) MAG 1100 (PFA) 	<ul style="list-style-type: none"> DN10 ... 100 (3/8" ... 4"): Platinum with gold / Titanium brazing alloy DN 2 ... 6 (1/12" ... 1/4"): Platinum DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276/2.4819 DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602 	Platinum with gold / Titanium brazing alloy
Cable entries		
	<ul style="list-style-type: none"> Remote installation 2 x M20 or 2 x 1/2" NPT Compact installation <ul style="list-style-type: none"> MAG 5000/MAG 6000: 4 x M20 or 4 x 1/2" NPT MAG 6000 I: 2 x M25 (for supply/output) MAG 6000 I Ex: 2 x M25 (for supply/output) 	Remote installation 2 x M20 or 2 x 1/2" NPT
Certificates and approvals		
Calibration		
<ul style="list-style-type: none"> Standard production calibration (default), calibration report shipped with sensor Special calibration 	Zero-point, 2 x 25 %, 2 x 90 % 5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point or 10-point	Zero-point, 2 x 25 %, 2 x 90 %
Conforms to	<ul style="list-style-type: none"> PED – 97/23/EC³⁾ (Fluid group: Liquid of fluid group 1) CRN (PFA) 	<ul style="list-style-type: none"> PED – 97/23/EC³⁾ CRN (PFA)
Material certificate EN 10204-3.1	Available when ordering together with meter ⁴⁾	Available when ordering together with meter ⁴⁾
Ex approvals		
<ul style="list-style-type: none"> MAG 1100 (Ceramic) <ul style="list-style-type: none"> Ex sensor or Compact with MAG 6000 I Ex Sensor with/without MAG 5000/6000 /6000 I MAG 1100 (PFA) <ul style="list-style-type: none"> Sensor with/without MAG 5000/6000/6000 I Custody transfer approval (MAG 5000/6000 CT)²⁾ 	ATEX 2G D sensor Ex de ia IIB T3 - T6 FM Class I, Div 2 FM Class I, Div 2	ATEX 2G D sensor Ex de ia IIB T3 - T6 FM Class I, Div 2
	<ul style="list-style-type: none"> Cold water pattern approval PTB (Germany) Hot water pattern approval PTB (Germany) Other media than water pattern approval- OIML R 117 (Ceramic liner) (Denmark) 	<ul style="list-style-type: none"> Hot water pattern approval PTB (Germany)

¹⁾ Conditions are also dependent on liner characteristics

²⁾ With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F)

³⁾ For further information on the PED standard and requirements, see page 9/6.

⁴⁾ Has to be ordered with the meter. It is not possible to order the certificate afterwards.

For technical specification for transmitter - see transmitter pages.

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 1100 EPDM gaskets included	7ME6110 - A 0 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Diameter	
DN 2 (1/12")	1 D
DN 3 (1/8")	1 H
DN 6 (1/4")	1 M
DN 10 (3/8")	1 R
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
Liner material	
PFA - DN 10 ... 100 (3/8" ... 4") (not for Ex)	1
Ceramic	2
Electrode material	
Hastelloy C (only with PFA liner)	1
Platinum (only with ceramic liner)	2
Transmitter	
Standard sensor for remote transmitter (order transmitter separately)	A
Ex sensor for remote transmitter (order transmitter separately)	B
MAG 6000 I, Aluminum 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminum 18 ... 30 V DC, Ex	D
MAG 6000 I, Aluminum 115 ... 230 V AC, Ex	E
MAG 6000 Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	H
MAG 6000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric: Polyamide terminal box or 6000 I compact	1
1/2" NPT: Polyamide terminal box or 6000 I compact	2
Metric: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	3
1/2" NPT: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	4

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

1) Quick ship only in combination with Ceramic liner

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Special calibration	
• 5-point calibration ¹⁾	D01
• 10-point calibration ²⁾	D06
• Default (2 x 25 % and 2 x 90 %) matched-pair calibration	D11
• 5-point, matched-pair calibration ¹⁾	D15
• 10-point, matched-pair calibration ²⁾	D18
Customer-specific converter setup	Y20
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Material certificate according to EN 10204-3.1	C12
Factory certificate according to EN 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.) (not for Ex sensors)	Y41
Other postproduction requirements (add desired text)	Y99
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	On request³⁾
• Customer-specified calibration up to 10 points	On request³⁾
• Customer-witnessed calibration Any of above calibration	On request³⁾

- 1) 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}
- 2) Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}
- 3) Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on <http://www.automation.siemens.com/mcms/automation/en/sensor-systems/process-instrumentation/Pages/Default.aspx> and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 1100

Description	Article No.
Handbook	
• English	A5E02435647

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at: <http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Selection and Ordering data	Article No.
Sensor SITRANS F M	
MAG 1100 HT High Temperature	7 ME 6 1 2 0 -
Ceramic liner, Platinum electrode, Graphite gaskets included	A 2 0 - 2 A
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Diameter	
DN 15 (½")	1 V
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 80 (3")	3 M
DN 100 (4")	3 T
Transmitter	
Standard sensor for remote transmitter (order transmitter separately)	A
Ex sensor for remote transmitter (order transmitter separately)	B
Cable glands/terminal box	
Metric: SS terminal box	3
½" NPT: SS terminal box	4

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Special calibration	
• 5-point calibration ¹⁾	D01
• 10-point calibration ²⁾	D06
• Default (2 x 25 % and 2 x 90 %) matched-pair calibration	D11
• 5-point, matched-pair calibration ¹⁾	D15
• 10-point, matched-pair calibration ²⁾	D18
Customer-specific converter setup	Y20
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Material certificate according to EN 10204-3.1	C12
Factory certificate according to EN 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.) (not for Ex sensors)	Y41
Other postproduction requirements (add desired text)	Y99
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	On request³⁾
• Customer-specified calibration up to 10 points	On request³⁾
• Customer-witnessed calibration Any of above calibration	On request³⁾

¹⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

²⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

³⁾ Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on <http://pi.khe.siemens.de/index.aspx?Nr=17460> and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 1100

Description	Article No.
Handbook	
• English	A5E02435647
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.	
All literature is also available for free at: http://www.siemens.com/flowdocumentation	
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I Ex ATEX 2G D transmitters and sensors are delivered compact mounted from factory. Communication module will be premounted in the transmitter.	
Please use online Product selector to get latest updates.	
Product selector link: www.pia-selector.automation.siemens.com	

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220



- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Accessories for MAG 1100 sensor	Article No.	Accessories for MAG 1100 sensor	Article No.
Pipe connection ½" external thread		Grounding ring SS	
For DN 2 ... 10 (1/12" ... 3/8") sensor, material: SS 316 2 pipe connections, 2 EPDM gaskets, 12 pcs M4 x 12 screws		Material: AISI 316/1.4436; each set includes: 1 grounding ring ¹⁾ , 3 PTFE gaskets, 1 earth wire, 1 M6 screw	
• ½" G, ISO 7-1 tapered thread, SS 316	◆ FDK:083G0080	• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G0686
• ½" NPT thread, SS 316	◆ FDK:083G4330	• DN 15 (½")	◆ FDK:083G0687
For DN 2 ... 10 (1/12" ... 3/8") sensor, material: Hastelloy C 2 pipe connections, 2 PTFE gaskets, 12 pcs M4 x 14 screws		• DN 25 (1")	◆ FDK:083G0689
• ½" G, ISO 7-1 tapered thread	◆ FDK:083G4332	• DN 40 (1½")	FDK:083G0691
• ½" NPT thread	◆ FDK:083G4331	• DN 50 (2")	FDK:083G0692
For DN 2...10 (1/12" ... 3/8") sensor 2 PVDF pipe connections (Max. 70 °C, PN 8 bar/max 158 °F, 116 PSI), 1 grounding ring ¹⁾ , 1 earthing wire, 3 PTFE gaskets, 2 space rings, 6 pcs. M4 x 12 and 6 pcs. M4 x 20 screws		• DN 65 (2½")	FDK:083G0693
• ½"G, ISO 7-1 tapered thread PVDF incl. grounding ring Hastelloy C22/2.4602	A5E01018395	• DN 80 (3")	FDK:083G0694
• ½" NPT thread PVDF incl. grounding ring Hastelloy C22/2.4602	A5E01018400	• DN 100 (4")	FDK:083G0695
EPDM gaskets		Grounding ring (Hastelloy C)	
Material: EPDM; each set includes: 2 EPDM gaskets, 1 earthing wire, 1 M6 screw, 1 nut, 1 washer, 1 bolt earthing plate		Material: Hastelloy C22/2.4602; each set includes: 1 grounding ring ¹⁾ , 3 PTFE gaskets, 1 earth wire, 1 M6 screw	
• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G3116	• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G3256
• DN 15 (½")	◆ FDK:083G3117	• DN 15 (½")	◆ FDK:083G3257
• DN 25 (1")	◆ FDK:083G3119	• DN 25 (1")	◆ FDK:083G3259
• DN 40 (1½")	◆ FDK:083G3121	• DN 40 (1½")	◆ FDK:083G3261
• DN 50 (2")	◆ FDK:083G3122	• DN 50 (2")	◆ FDK:083G3262
• DN 65 (2½")	◆ FDK:083G3123	• DN 65 (2½")	FDK:083G3263
• DN 80 (3")	◆ FDK:083G3124	• DN 80 (3")	FDK:083G3264
• DN 100 (4")	◆ FDK:083G3125	• DN 100 (4")	FDK:083G3265
PTFE gaskets		Grounding ring (Tantalum)	
Material: PTFE; each set includes: 2 gaskets, 2 earthing wires, 3 M6 screws (DN 2 ... DN 10: 12 pcs M4 x 14)		Material: Tantalum; each set includes: 1 grounding ring ¹⁾ , 3 PTFE gaskets, 1 earth wire, 1 M6 screw	
• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G0156	• DN 2 ... 10 (1/12" ... 3/8")	A5E01181599
• DN 15 (½")	◆ FDK:083G0157	• DN 15 (½")	A5E01181606
• DN 25 (1")	◆ FDK:083G0159	• DN 25 (1")	A5E01181610
• DN 40 (1½")	◆ FDK:083G0161	• DN 40 (1½")	A5E01181613
• DN 50 (2")	◆ FDK:083G0162	• DN 50 (2")	A5E01181615
• DN 65 (2½")	◆ FDK:083G0163	• DN 65 (2½")	A5E01181616
• DN 80 (3")	◆ FDK:083G0164	• DN 80 (3")	A5E01181619
• DN 100 (4")	◆ FDK:083G0165	• DN 100 (4")	A5E01181622
Graphite gaskets		Studs and nuts	
Material: Graphite; conductive, each set includes: 2 gaskets (conductive (can also be used as grounding ring))		for DN 100 PN 25/40, 8 M20 studs, 16 M20 nuts	
• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G0116	Material: AISI 304/1.4305	
• DN 15 (½")	◆ FDK:083G0117	• DN 100 (4")	◆ FDK:083G0226
• DN 25 (1")	◆ FDK:083G0119		
• DN 40 (1½")	◆ FDK:083G0121		
• DN 50 (2")	◆ FDK:083G0122		
• DN 65 (2½")	◆ FDK:083G0123		
• DN 80 (3")	◆ FDK:083G0124		
• DN 100 (4")	◆ FDK:083G0125		

¹⁾ Thickness of grounding ring is 2 mm (0.08 inch)

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

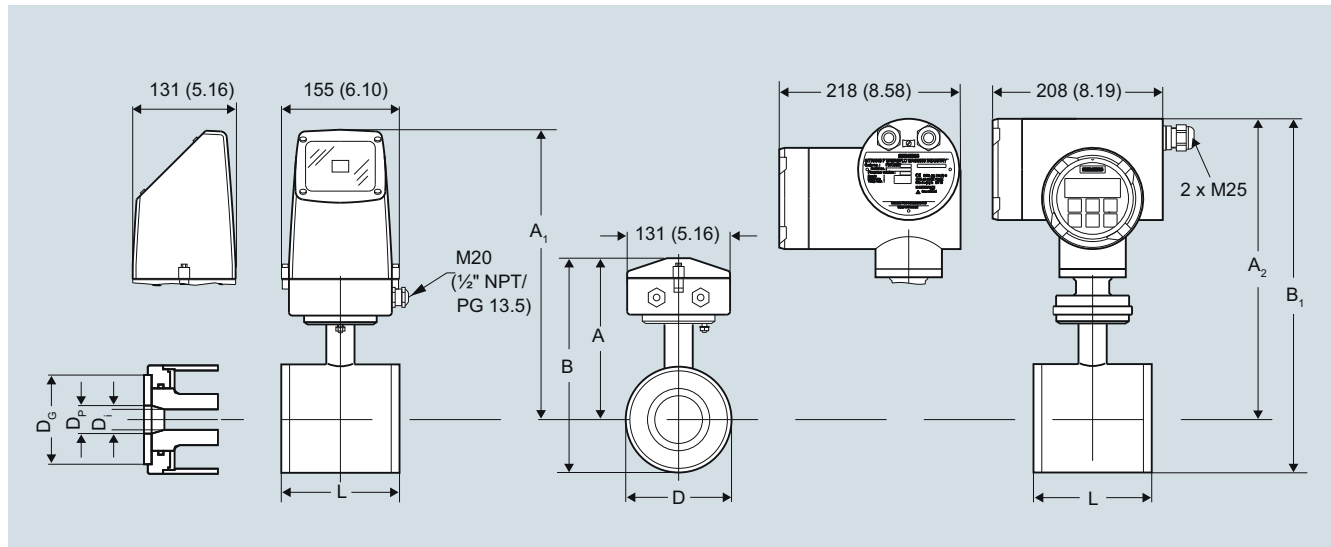
Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Dimensional drawings

Sensor MAG 1100, compact/remote



Dimensions in mm (inch)

Important note: For compact installation with MAG 6000 I/Ex - transmitter to be supported to avoid tension on the sensor part

Size DN	A ¹⁾ [mm]	B ¹⁾ [mm]	A ₁ /A ₂ ³⁾ [mm]	B ₁ [mm]	D [mm]	D _i [mm]	D _i (PFA) [mm]	D _p [mm]	D _G [mm]	Weight ²⁾ [kg]
2	161	186	315	340	48.7	2		17.3	34	2.2
3	161	186	315	340	48.7	3		17.3	34	2.2
6	161	186	315	340	48.7	6		17.3	34	2.2
10	161	186	315	340	48.7	10	10	13.6	34	2.2
15	161	186	315	340	48.7	15	16	17.3	40	2.2
25	169	201	323	354	63.5	25	26	28.5	56	2.7
40	179	221	333	375	84.0	40	38	43.4	75	3.4
50	188	239	342	393	101.6	50	50	54.5	90	4.2
65	198	258	351	412	120.9	65	66	68.0	112	5.5
80	204	270	357	424	133.0	80	81	82.5	124	7.0
100	217	296	370	450	159.0	100	100	107.1	150	10.0

Size [inch]	A ¹⁾ [inch]	B ¹⁾ [inch]	A ₁ /A ₂ ³⁾ [inch]	B ₁ [inch]	D [inch]	D _i [inch]	D _i (PFA) [inch]	D _p [inch]	D _G [inch]	Weight ²⁾ [lb]
1/12	6.34	7.33	12.40	13.39	1.92	0.08		0.68	1.34	4.8
1/8	6.34	7.33	12.40	13.39	1.92	0.12		0.68	1.34	4.8
1/4	6.34	7.33	12.40	13.39	1.92	0.24		0.68	1.34	4.8
3/8	6.34	7.33	12.40	13.39	1.92	0.39	0.39	0.53	1.34	4.8
1/2	6.34	7.33	12.40	13.39	1.92	0.59	0.63	0.68	1.57	4.8
1	6.66	7.92	12.72	13.94	2.50	0.98	1.02	1.12	2.20	4.9
1 1/2	7.05	8.70	13.11	14.76	3.31	1.57	1.50	1.71	2.95	7.5
2	7.40	9.41	13.47	15.47	4.00	1.97	1.97	2.15	3.54	9.2
2 1/2	7.80	10.16	13.82	16.22	4.76	2.56	2.60	2.68	4.41	12
3	8.03	10.63	14.06	16.70	5.24	3.15	3.19	3.25	4.88	15
4	8.54	11.65	14.57	17.72	6.26	3.94	3.94	4.22	5.91	22

¹⁾ 14.5 mm/0.571" shorter when the AISI terminal box is used (Ex or high temperature 200 °C (392 °F) version)

²⁾ With transmitter MAG 5000 or MAG 6000 installed, weight is increased by approximately 0.8 kg (1.8 lb).

With MAG 6000 I weight is increased with 5.5 kg (12.1 lb).

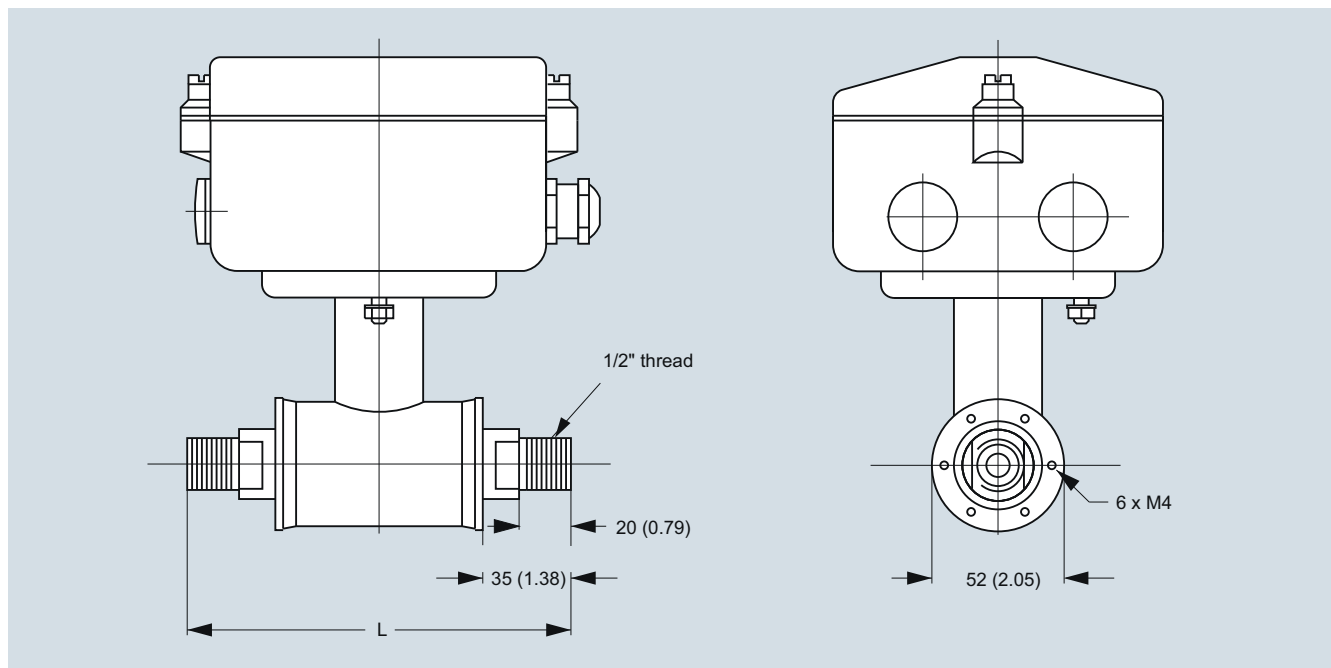
³⁾ A₂ is 3 mm (0.12") shorter than A₁

The total build-in length "L" [mm]/[inch] before assembling depends on the gasket selected

Size DN		EPDM		Graphite		PTFE (Teflon)		Without gasket		Earthing ring	
		[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
2 ... 10 ¹⁾	1/12 ... 3/8	64	2.52	66	2.60	70	2.75	64	2.52	77	3.03
15	1/2	65	2.56	66	2.60	70	2.75	64	2.52	77	3.03
25	1	80	3.15	81	3.19	85	3.35	79	3.10	92	3.62
40	1 1/2	95	3.74	96	3.78	100	3.94	94	3.70	107	4.21
50	2	105	4.13	106	4.17	110	4.33	104	4.05	117	4.61
65	2 1/2	130	5.12	131	5.15	135	5.31	129	5.05	142	5.60
80	3	155	6.10	156	6.14	160	6.30	154	6.00	167	6.57
100	4	185	7.28	186	7.31	190	7.48	184	7.20	197	7.76

¹⁾ Mounting between two flanges

Sensor MAG 1100 DN 2 ... 10 (1/12" ... 3/8") with adapters



The MAG 1100 DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8") are prepared for assembly with the 1/2" pipe connections. Dimensions in mm (inch)
The length "L" varies dependent on the gasket choice.

Stainless steel and Hastelloy pipe connections								PVDF pipe connections	
Without gasket		EPDM		Graphite		PTFE		PTFE	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
150	5.9	150	5.9	152	6.0	156	6.1	133	5.2

Important note:

For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Overview



The electromagnetic sensor SITRANS F M MAG 1100 F is designed to meet applications in the food and beverage industry.

Benefits

- Sensor sizes: DN 10 to DN 100 (3/8" to 4")
- AISI 316 stainless steel enclosure
- Sensor: Hygienic connection, 3A approval and EHEDG certified
- Sanitary design for CIP / SIP cleaning
- Conforms to FDA
- Easy commissioning, the SENSORPROM unit automatically updates settings
- Hose proof IP67/NEMA 4X enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints

Application

The main applications of the SITRANS F M electromagnetic sensors can be found in the following fields:

- Food industry
- Beverage industry
- Pharmaceutical industry

Design

- Unique mechanical design with a wide range of customer specified sanitary connection
- Compact or remote mounting possible easy "plug & play" field changeable
- Simple on site upgrade to IP68/NEMA 6P terminal box
- Ex ATEX 2G D version for hazardous areas (ceramic liner)

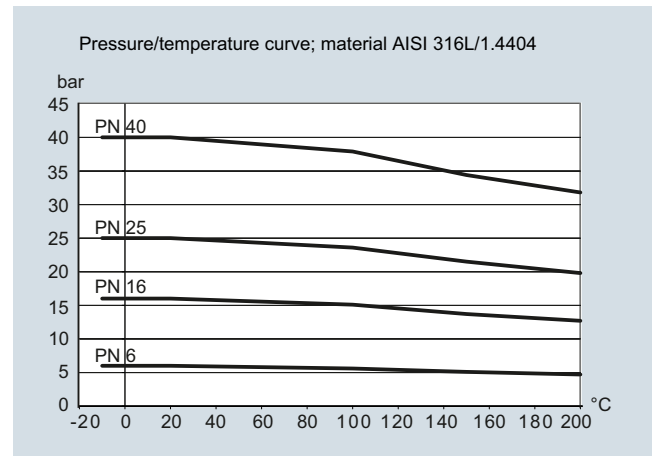
Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

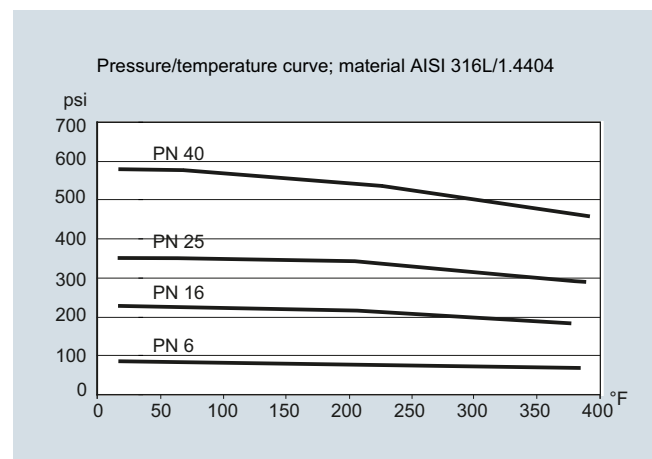
Integration

The complete flowmeter consists of a sensor and an associated transmitter SITRANS F M MAG 5000, 6000 and 6000 I. The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as PROFIBUS DP and PA, Modbus RTU/RS 485, HART, FOUNDATION Fieldbus H1, DeviceNet.

Pressure/temperature curve; material AISI 316L/1.4404



Pressure/temperature curve; material AISI 316L/1.4404



For further information on the PED standard and requirements, see page 9/6.

Technical specifications

Measuring principle	Electromagnetic induction	
Excitation frequency (Mains supply: 50 Hz/60 Hz)	DN 10 ... 65 (1/4" ... 2 1/2"): 12.5 Hz/15 Hz DN 80 ... 100 (3", 4"): 6.25 Hz/7.5 Hz	
Process connection		
Nominal size	DN 10 ... DN 100 (3/8" ... 4")	
Process connection	Hygienic adapters available for: • Direct welding onto pipe • Clamp fitting • Threaded fitting	
Rated operating conditions		
<u>Ambient conditions</u>		
Ambient temperature ¹⁾		
• Sensor	-40 ... +100 °C (-40 ... +212 °F)	
• Ex sensor	-20 ... +60 °C (-4 ... +140 °F)	
• Compact transmitter MAG 5000/6000 ²⁾	-20 ... +60 °C (-4 ... +140 °F)	
• Transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)	
• Compact transmitter MAG 6000 I Ex	-20 ... +60 °C (-4 ... +140 °F)	
<u>Temperature of medium</u>		
MAG 1100 F (Ceramic)	-20 ... +150 °C (-4 ... +302 °F) Suitable for steam sterilization	
MAG 1100 F (PFA)	-30 ... +130 °C (-22 ... +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	
<u>Temperature shock</u>		
MAG 1100 F		
• Duration ≤ 1 min, followed by 10 min rest	• DN 10, 15, 25: Max. ΔT ≤ 80 °C/min (3/8", 1/2", 1"): Max. ΔT ≤ 144 °F/min • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1 1/2", 2", 2 1/2"): Max. ΔT ≤ 126 °F/min • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4"): Max. ΔT ≤ 108 °F/min	
MAG 1100 F (PFA)	Max. ± 100 °C (212 °F) momentarily	
<u>Operating pressure</u>		
MAG 1100 F (Ceramic)	DN 10 ... 65: 40 bar (3/8" ... 2 1/2"): 580 psi DN 80: 25 bar (3": 363 psi) DN 100: 25 bar (4": 363 psi) Vacuum: 1 x 10 ⁻⁶ bar _{abs} (1.5 x 10 ⁻⁵ psi _{abs})	
MAG 1100 F (PFA)	20 bar (290 psi) Vacuum: 0.02 bar _{abs} (0.3 psi _{abs}) DN 80 ... DN 100: CO ₂ pressure max. 7 bar (101.5 psi)	
<u>Mechanical load (vibration)</u>		
	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 g RMS Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS. Sensor with compact MAG 6000 I/MAG 6000 I Ex mounted transmitter: 1.14 g RMS For compact installation with the MAG 6000 I/MAG 6000 I Ex, trans- mitter to be supported to avoid tension on sensor part.	
<u>Enclosure rating</u>		
EMC	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min 2004/108/EC	
Design		
Weight		See Dimensional drawings
<u>Material</u>		
Enclosure		
• MAG 1100 F		Stainless steel AISI 316L/1.4404
Terminal box (remote version only)		
• Standard		Fibre glass reinforced polyamide Stainless steel AISI 316/1.4436
• Option		
• Ex ATEX (remote version only)		Stainless steel AISI 316/1.4436
Liner		
MAG 1100 F (Ceramic)		Aluminum oxide Al ₂ O ₃ (ceramics)
MAG 1100 F (PFA)		Reinforced PFA (teflon) (not for Ex)
Electrodes		
MAG 1100 F (Ceramic)		Platinum with gold /Titanium brazing alloy
MAG 1100 F (PFA)		• DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276/2.4819 • DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602
Cable entries		
		• Remote installation 2 x M20 or 2 x 1/2" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x 1/2" NPT - MAG 6000 I: 2 x M25 (for sup- ply/output) - MAG 6000 I Ex: 2 x M25 (for supply/output)
Certificates and approvals		
Calibration		
• Standard Production calibration, calibration report shipped with sensor		Zero-point, 2 x 25 %, 2 x 90 %
MAG 1100 F (Ceramic)		3A (sensor with Polyamide termi- nal box and FKM/FPM or EPDM gaskets), transmitter not part of the approval
• Ex ATEX approvals for sensor or compact with MAG 6000 I Ex		ATEX 2G D sensor EEx d e ia IIB T3 - T6
• Sensor with/without MAG 5000/6000/6000 I		FM Class I, Div 2
MAG 1100 F (PFA)		3A (sensor with Polyamide termi- nal box with EPDM gasket), trans- mitter not part of the approval EHEDG certified (use EPDM gasket) (DN 25 ... 100 (1 ... 4")) FM Class I, Div 2 Hygienic EC 1925:2003 European food contact material
Material certificate EN 10204 3.1		Available when ordering together with meter ³⁾
Conforms to		• PED – 97/23/EC ⁴⁾ • CRN (PFA) • FDA
Custody transfer approvals (MAG 5000/6000 CT)		• Cold water pattern approval PTB (Germany) • Hot water pattern approval PTB (Germany) • Other media than water pattern approval- OIML R 117 (Ceramic liner)(Denmark)

1) Conditions are also dependent on liner characteristics.

2) With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C
(-4 ... +122 °F)3) Has to be ordered with the meter. It is not possible to order the certificate
afterwards.4) For further information on the PED standard and requirements, see
page 9/6.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories

Weld-in adapter

Adapter for welding onto dairy pipe	Tri-Weld, ISO 2037, DIN 11850, SMS 3008, BS 4825-1
• DN 10, 15, 25, 40, 50 and 65 (3/8", 1/2", 1", 1 1/2", 2" and 2 1/2")	PN 40 (600 psi)
• DN 80 and DN 100 (3" and 4")	PN 25 (350 psi)

Clamp adapter

	Tri-Clamp, ISO 2852, DIN 32676, SMS 3016, BS 4825-3
DN 10, 15, 25, 40 and 50 (3/8", 1/2", 1", 1 1/2", and 2")	PN 16 (200 psi)
DN 65, 80 and 100 (2 1/2", 3" and 4")	PN 10 (150 psi)

Thread adapter

DIN 11851	
• DN 10, 15, 25, and 40 (3/8", 1/2", 1", and 1 1/2")	PN 40 (600 psi)
• DN 50, 65, 80 and 100 (2", 2 1/2", 3" and 4")	PN 25 (350 psi)
ISO 2853, BS 4825-4	
• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", 1/2", 1", 1 1/2", 2", 2 1/2" and 3")	PN 16 (200 psi)
SMS 1145	
• DN 25, 40, 50, 65 and 80 (1", 1 1/2", 2", 2 1/2" and 3")	PN 6 (80 psi)

Design

Material

Adapter	Stainless steel AISI 316/1.4436
Gasket	
• MAG 1100 F (Ceramic)	FKM/FPM with stainless steel insert (AISI 304/1.4301) (-20 ... +150 °C (-4 ... +302 °F))
	EPDM (-20 ... +150 °C (-4 ... +302 °F))
• MAG 1100 F (PFA)	EPDM (-20 ... +150 °C (-4 ... +302 °F))
	NBR (-20 ... +100 °C (-4 ... +212 °F))

Note:

When combined sensor and adapter, the operating pressure is the lower rated of the pair.

Selection and Ordering data

Sensor SITRANS F M MAG 1100 F

Article No.

7 ME 6 1 4 0 -

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter

DN 10 (3/8")	1 R
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T

Process connections

No adaptors (specials see accessories)	A
<u>Weld in</u>	
DIN 11850	B
ISO 2037 (SMS 3008)	C
BS 4825-1	D
Tri-Weld	E
<u>Clamp type</u>	
DIN 32676	G
ISO 2852 (SMS 3016)	H
BS 4825-3	J
Tri-Clamp	K
<u>Threaded type</u>	
DIN 11851	M
SMS 1145 ¹⁾	N

Liner material

PFA (not for Ex)	1
Ceramic	2

Gasket material¹⁾

EPDM flat gasket (FDA, 3A)	0
FPM/FKM (FDA, 3A) (only with ceramic liner)	2
EPDM-P gasket (only for PFA) (FDA, EHEDG certified, 3A)	3

Electrode material

Hastelloy C (only with PFA liner)	1
Platinum (only with ceramic liner)	2


Transmitter

Standard sensor for remote transmitter (order transmitter separately), 3A	A
Ex sensor for remote transmitter (order transmitter separately) 3A	B
MAG 6000 I, Alu. 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminum 18 ... 30 V DC, Ex	D
MAG 6000 I, Aluminum 115 ... 230 V AC, Ex	E
MAG 6000, Polyamide, 11 ... 30 V DC/11 ... 24 V AC	H
MAG 6000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 11 ... 30 V DC/11 ... 24 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L

Communication

No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J

¹⁾ SMS 1145 standard is not approved by 3A

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 1100 F	7 ME 6 1 4 0 -
Cable glands/terminal box	
Metric: Polyamide terminal box or 6000 I compact	1
½" NPT: Polyamide terminal box or 6000 I compact	2
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	3
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	4
<ul style="list-style-type: none"> We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix. 	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Customer-specific converter setup	Y20
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Material certificate according to EN 10204-3.1	C12
Factory certificate according to EN 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted with wired cable (specify cable Article No.) (not for Ex sensors)	Y41
Other postproduction requirements (add desired text)	Y99
Additional calibrations	
<ul style="list-style-type: none"> Matched pair - (Standard production calibration where sensor and transmitter is calibrated together) 	On request¹⁾
<ul style="list-style-type: none"> Customer-specified calibration up to 10 points 	On request¹⁾
<ul style="list-style-type: none"> Customer-witnessed calibration Any of above calibration 	On request¹⁾

¹⁾ Ordering "On request" as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on <http://intranet.automation.siemens.com/w1/automation-technology-flow-measurement-18626.htm#content-19336¶1=Flow%20Measurement> and send together with the order. (Size dependent restriction on maximum flow rates may apply)


Operating instructions for SITRANS F M MAG 1100F


Description	Article No.
Handbook	
<ul style="list-style-type: none"> English 	A5E02435647
<p>This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.</p> <p>All literature is also available for free at: http://www.siemens.com/flowdocumentation</p>	

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I Ex ATEX 2G D transmitters and sensors are delivered compact mounted from factory. Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.
 Product selector link:
www.pia-selector.automation.siemens.com

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	<ul style="list-style-type: none"> FDK:085U0220 

- We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories

Article No.

Weld-in connection fittings for MAG 1100 F with P gaskets for EHEDG

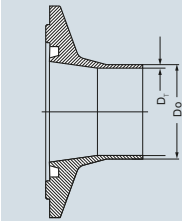
Only for sensors with PFA liner.

2 pcs. fittings

2 pcs. clamps (to join flow sensor and fitting),
P gaskets not included

DIN 11850

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)



10 ²⁾	13	1.5	10	◆ A5E02054630
15 ²⁾	19	1.5	15 ³⁾	◆ A5E02054633
20	23	1.5	15	◆ A5E02054634
25	29	1.5	25 ³⁾	◆ A5E02054635
32	35	1.5	25	◆ A5E02054637
40	41	1.5	40	◆ A5E02054638
50	53	1.5	50	◆ A5E02054640
65	70	2.0	65	◆ A5E02054643
80	85	2.0	80	◆ A5E02054644
100	104	2.0	100	◆ A5E02054646

ISO 2037

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.0	10	◆ A5E03727946
17.2	17.2	1.0	15	◆ A5E03728098
25	25	1.6	25 ³⁾	◆ A5E02196073
33	33.7	1.6	25	◆ A5E02196074
38	38	1.6	40 ³⁾	◆ A5E02196075
40	40	1.6	40	◆ A5E02196076
51	51	1.6	50	◆ A5E02196077
63.5	63.5	1.6	65	◆ A5E02196078
76.1	76.1	1.6	80	◆ A5E02196080
101.6	101.6	2.0	100	◆ A5E02196082

Tri-Weld (BS 4825-1)

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.2	10	◆ A5E02199113
19.05	19.05	1.2	15	◆ A5E02199114
25.4	25.4	1.6	25	◆ A5E02199115
38.1	38.1	1.6	40	◆ A5E02199116
50.8	50.8	1.6	50	◆ A5E02199117
63.5 ¹⁾	63.5	1.6	65	◆ A5E02199118
76.2	76.2	1.6	80	◆ A5E02199119
101.6 ¹⁾	101.6	2.0	100	◆ A5E02199120

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter

1) For BS 4825-1 see ISO 2037

2) Not EHEDG approved

3) Default delivery

Accessories

Article No.

Clamp-type connection fittings for MAG 1100 F with P gaskets for EHEDG

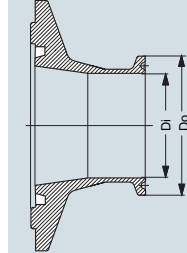
Only for sensors with PFA liner.

2 pcs. fittings

2 pcs. clamps (to join flow sensor and fitting),
P gaskets not included

DIN 32676

Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



10	34	10	10	◆ A5E02211143
15	34	16	15	◆ A5E02211144
25	50.5	22.6	25	◆ A5E02211146
40	50.5	38	40	◆ A5E02211147
50	64	50	50	◆ A5E02211148
65	91	66	65	◆ A5E02211151
80	106	81	80	◆ A5E02211152
100	119	100	100	◆ A5E02211153

ISO 2852

Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)

25	50.5	22.6	25 ¹⁾	◆ A5E02213581
33.7	50.5	31.3	25	◆ A5E02213582
38	50.5	35.6	40	◆ A5E02213583
51	64	48.6	50	◆ A5E02213584
63.5	77.5	60.3	65	◆ A5E02213585
76.1	91	72.9	80	◆ A5E02213586
101.6	119	97.6	100	◆ A5E02213587

Tri-Clamp (BS 4825-3)

Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)

12.7	25.4	9.5	10	◆ A5E02213596
19.05	25.4	15.85	15	◆ A5E02213597
25.4	50.5	22.2	25	◆ A5E02213598
38.1	50.5	34.9	40	◆ A5E02213599
50.8	64	47.6	50	◆ A5E02213600
63.5	77.5	60.3	65	◆ A5E02213601
76.2	91	73	80	◆ A5E02213602
101.6	119	97.6	100	◆ A5E02213603

D_o: Outer diameterD_i: Inner diameter

1) Default delivery

Accessories

Article No.

Threaded type connection fittings for MAG 1100 F with P gaskets for EHEDG

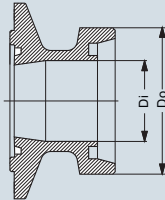
Only for sensors with PFA liner.

2 pcs. fittings

2 pcs. clamps (to join flow sensor and fitting),
P gaskets not included**DIN 11851**

Adapter

Sensor

DN (mm) D_o (mm) D_i (mm) DN (mm)

10	28	10	10
15	34	16	15 ²⁾
20	44	20	15
25	52	26	25 ²⁾
32	58	32	25
40	65	38	40
50	78	50	50
65	95	66	65
80	110	81	80
100	130	100	100

A5E02218293
A5E02218294
A5E02218295
 ◆ **A5E02218296**
A5E02218297
 ◆ **A5E02218298**
 ◆ **A5E02218299**
A5E02218300
A5E02218301
A5E02218302

Accessories

Article No.

Threaded type connection fittings for MAG 1100 F with P gaskets for EHEDG

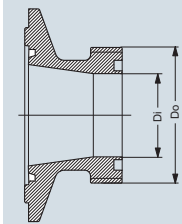
Only for sensors with PFA liner.

2 pcs. fittings

2 pcs. clamps (to join flow sensor and fitting),
P gaskets not included**SMS 1145¹⁾**

Adapter

Sensor

DN (mm) D_o (mm) D_i (mm) DN (mm)

25	40	22.6	25
38	60	35.6	40
51	70	48.6	50
63.5	85	60.3	65
76	98	72	65 ²⁾

A5E02218310
A5E02218312
A5E02218313
A5E02218314
A5E02218315

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter¹⁾ SMS 1145 standard is not approved by 3A²⁾ Default delivery

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories

Article No.

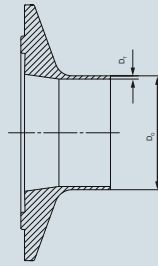
Weld in connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting),
flat gaskets not included

DIN 11850

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)



10	13	1.5	10	◆ FDK:083G2116
15	19	1.5	15 ²⁾	◆ FDK:083G2117
20	23	1.5	15	◆ FDK:083G2118
25	29	1.5	25 ²⁾	◆ FDK:083G2119
32	35	1.5	25	◆ FDK:083G2120
40	41	1.5	40	◆ FDK:083G2121
50	53	1.5	50	◆ FDK:083G2122
65	70	2.0	65	◆ FDK:083G2123
80	85	2.0	80	◆ FDK:083G2124
100	104	2.0	100	◆ FDK:083G2125

ISO 2037

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.0	10	A5E03720273
17.2	17.2	1.0	15	FDK:083G2107
25	25.6	1.6	25 ²⁾	FDK:083G2109
33.7	33.7	1.6	25	FDK:083G2100
38	38	1.6	40 ²⁾	FDK:083G2111
40	40	1.6	40	FDK:083G2101
51	51	1.6	50	FDK:083G2112
63.5	63.5	1.6	65	FDK:083G2113
76.1	71.1	1.6	80	FDK:083G2114
101.6	101.6	2.0	100	FDK:083G2115
114.3	118.3	2.0	100	FDK:083G2105

Tri-Weld (BS 4825-1)

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.2	10	FDK:083G2276
19.05	19.05	1.2	15	FDK:083G2277
25.4	25.4	1.6	25	FDK:083G2279
38	38.1	1.6	40	FDK:083G2281
50.8	50.8	1.6	50	FDK:083G2282
63.5 ¹⁾	63.5	1.6	65	FDK:083G2283
76.2	76.2	1.6	80	FDK:083G2284
101.6 ¹⁾	101.6	2.0	100	FDK:083G2285

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter¹⁾ For BS 4825-1 see ISO 2037²⁾ Default delivery

Accessories

Article No.

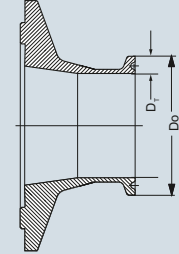
Clamp-type connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting),
flat gaskets not included

DIN 32676

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)



10	34	10	10	FDK:083G2186
15	34	16	15	FDK:083G2187
25	50.5	26	25	FDK:083G2179
40	50.5	38	40	FDK:083G2181
50	64	50	50	FDK:083G2182
65	91	66	65	FDK:083G2183
80	106	81	80	FDK:083G2184
100	119	100	100	FDK:083G2185

ISO 2852

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

25	50.5	22.6	25 ¹⁾	FDK:083G2189
33.7	50.5	31.3	25	FDK:083G2190
38	50.5	35.6	40	FDK:083G2191
51	64	48.6	50	FDK:083G2192
63.5	77.5	60.3	65	FDK:083G2193
76.1	91	72.9	80	FDK:083G2194
101.6	119	97.6	100	FDK:083G2195

Tri-Clamp (BS 4825-3)

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	25.4	9.5	10	FDK:083G2286
19.05	25.4	15.85	15	FDK:083G2287
25.4	50.5	22.2	25	◆ FDK:083G2289
38.1	50.5	34.9	40	FDK:083G2291
50.8	64	47.6	50	◆ FDK:083G2292
63.5	77.5	60.3	65	FDK:083G2293
76.2	91	73	80	◆ FDK:083G2294
101.6	119	97.6	100	FDK:083G2295

D_o: Outer diameterD_i: Inner diameter¹⁾ Default delivery

Accessories

Article No.

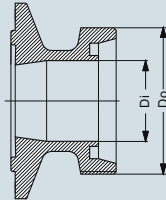
Threaded type connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
 2 pcs. clamps (to join flow sensor and fitting),
 flat gaskets not included

DIN 11851

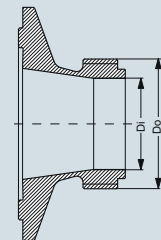
Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



10	28	10	10	FDK:083G2156
15	34	16	15 ²⁾	FDK:083G2157
20	44	20	15	FDK:083G2158
25	52	26	25 ²⁾	◆ FDK:083G2159
32	58	32	25	FDK:083G2160
40	65	38	40	◆ FDK:083G2161
50	78	50	50	◆ FDK:083G2162
65	95	66	65	FDK:083G2163
80	110	81	80	FDK:083G2164
100	130	100	100	FDK:083G2165

ISO 2853

Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



25	37	22.6	25	FDK:083G2149
38	51	35.6	40	FDK:083G2151
51	64	48.6	50	FDK:083G2152
63.5	78	60.3	65	FDK:083G2153
76.1	91	72.9	80	FDK:083G2154

BS 4825-4

Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)

25.4	37	22.2	25	A5E03732429
38.1	51	34.9	40	A5E03732431
50.8	64	47.6	50	A5E03732433
63.5	78	60.3	65	A5E03732434
76.2	91	73	80	A5E03732435
101.6	126	97.6	100	FDK:083G2145

Accessories

Article No.

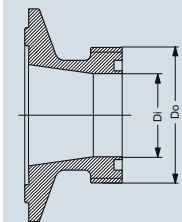
Threaded type connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
 2 pcs. clamps (to join flow sensor and fitting),
 flat gaskets not included

SMS 1145¹⁾

Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



25	40	22.6	25	◆ FDK:083G2139
38	60	35.6	40	FDK:083G2141
51	70	48.6	50	◆ FDK:083G2142
63.5	85	60.3	65	FDK:083G2143
76	98	72	65 ²⁾	FDK:083G2144

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter¹⁾ SMS 1145 standard is not approved by 3A²⁾ Default delivery

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Spare parts for MAG 1100 F

Article No.

Gaskets

(delivered in pairs, to be placed between flow sensor and adapter)

MAG 1100 F (PFA) - P gaskets

Rubber: EPDM (FDA)

- DN 10 ◆ **A5E02055286**
- DN 15 ◆ **A5E02055287**
- DN 25 ◆ **A5E02055290**
- DN 40 ◆ **A5E02055291**
- DN 50 ◆ **A5E02055292**
- DN 65 ◆ **A5E02055293**
- DN 80 ◆ **A5E02055295**
- DN 100 ◆ **A5E02055297**

MAG 1100 F (ceramic) - flat gaskets

Rubber: FKM/FPM (FDA)

- DN 10 ◆ **A5E00915707**
- DN 15 ◆ **A5E00915764**
- DN 25 ◆ **A5E00915771**
- DN 40 ◆ **A5E00915773**
- DN 50 ◆ **A5E00915775**
- DN 65 ◆ **A5E00915780**
- DN 80 ◆ **A5E00915782**
- DN 100 ◆ **A5E00915784**

MAG 1100 F (PFA) - flat gaskets

Rubber: EPDM (FDA)

- DN 10 ◆ **FDK:083G2206**
- DN 15 ◆ **FDK:083G2207**
- DN 25 ◆ **FDK:083G2209**
- DN 40 ◆ **FDK:083G2211**
- DN 50 ◆ **FDK:083G2212**
- DN 65 ◆ **FDK:083G2213**
- DN 80 ◆ **FDK:083G2214**
- DN 100 ◆ **FDK:083G2215**

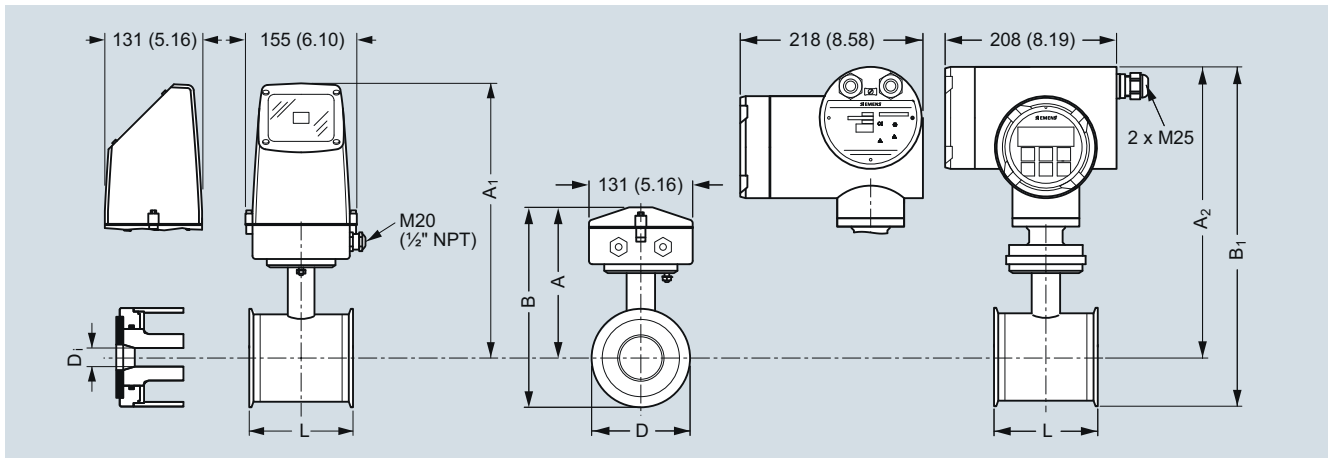
Rubber: NBR

- DN 10 **FDK:083G2216**
- DN 15 **FDK:083G2217**
- DN 25 **FDK:083G2219**
- DN 40 **FDK:083G2221**
- DN 50 **FDK:083G2222**
- DN 65 **FDK:083G2223**
- DN 80 **FDK:083G2224**
- DN 100 **FDK:083G2225**

- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Dimensional drawings

Sensor MAG 1100 F compact/remote



Dimensions in mm (inch)

Important note:**For compact installation with MAG 6000 I/Ex - Supports the transmitter to avoid tension on the sensor part.**

Size	L	A	A ₁ ³⁾	B ²⁾	B ₁	D	D ₁ (Al ₂ O ₃)	D ₁ PFA	Weight ¹⁾
DN	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
10	64	161	315	193.7	344.7	64.0	10	10	2.2
15	64	161	315	193.7	344.7	64.0	15	16	2.2
25	79	169	323	207.5	359.0	77.5	25	26	2.7
40	94	179	333	228.0	379.0	91.0	40	38	3.4
50	104	188	342	247.7	398.7	119.0	50	50	4.2
65	131	197.5	351	262.6	413.6	130.0	65	66	5.5
80	156	204	357	281.0	432.0	155.0	80	81	7.0
100	186	217	370	308.0	459.0	183.0	100	100	10.0

Size	L	A	A ₁ ³⁾	B ²⁾	B ₁	D	D ₁ (Al ₂ O ₃)	D ₁ PFA	Weight ¹⁾
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[lb]
3/8	2.52	6.34	12.40	7.62	13.57	2.52	0.39	0.39	4.8
1/2	2.52	6.34	12.40	7.62	13.57	2.52	0.59	0.63	4.8
1	3.11	6.66	12.72	8.17	14.13	3.05	0.98	1.02	4.9
1 1/2	3.70	7.05	13.11	8.98	14.92	3.58	1.57	1.50	7.5
2	4.09	7.40	13.47	9.75	15.70	4.68	1.97	1.97	9.2
2 1/2	5.16	7.78	13.82	10.34	16.28	5.12	2.56	2.60	12.0
3	6.14	8.03	14.06	11.06	17.01	6.10	3.15	3.19	15.0
4	7.32	8.54	14.57	12.13	18.07	7.20	3.94	3.94	22.0

¹⁾ With transmitter MAG 5000 or MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lb)
With MAG 6000 I weight is increased with 5.5 kg (12.1 lb)

²⁾ 14.5 mm (0.571") shorter when the AISI terminal box is used (always Ex version)

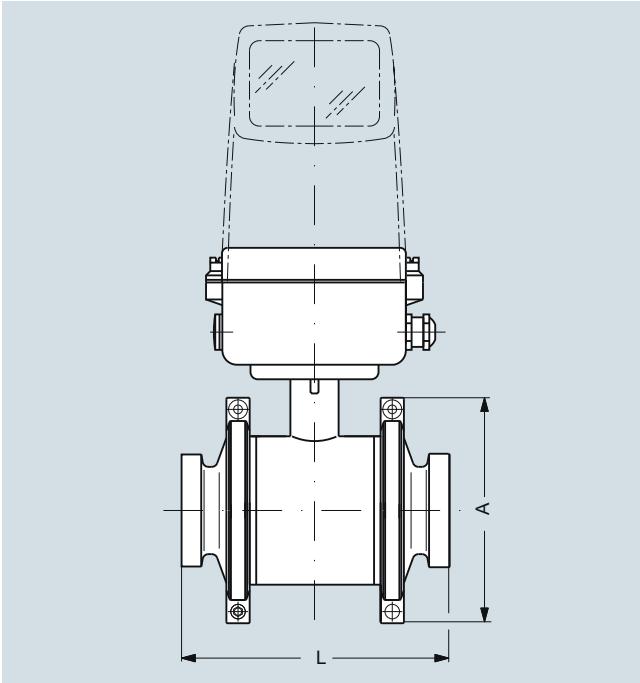
³⁾ A₂ is 3 mm (0.12") shorter than A₁

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Sensor MAG 1100 F compact/separate – build-in length



Size		A		L ¹⁾	
DN	inch	[mm]	[inch]	[mm]	[inch]
10	3/8	99	3.90	146	5.75
15	1/2	99	3.90	146	5.75
25	1	113	4.45	161	6.34
40	1 1/2	126	4.96	176	6.93
50	2	154	6.06	186	7.32
65	2 1/2	165	6.50	223	8.78
80	3	200	7.87	258	10.16
100	4	225	8.86	288	11.34

¹⁾ The total build-in length "L" is independent of the adapter type selected.

Overview



The SITRANS F M MAG 3100 is an electromagnetic flow sensor in a large variety that meets the demands of almost every flow application.

Benefits

- Wide range of sizes: DN 15 to DN 2000 (½" to 78")
- The flexible design is for all applications not covered by the standard industry-specific sensors: MAG 1100, MAG 1100 F, MAG 3100 P and MAG 5100 W
- Wide pressure range: PN 6 to PN 100
ANSI Class 150/300, AS 2129, AS 4087, JIS K10 and K20. On request up to 690 bar (10 000 psi)
- Wide range of electrode and liner material to fit even the most extreme process media
- Fully welded construction provides a ruggedness that suits the toughest applications and environments
- Easy commissioning, the SENSORPROM unit automatically updates settings.
- Designed to allow patented SITRANS F M in-situ verification using the SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Steel industry
- Mining
- Utility
- Power generation and distribution
- Oil and gas / HPI
- Water and waste water

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Ex ATEX and FM/CSA versions
- High temperature sensor for applications with temperatures up to 180 °C (356 °F)
- Approvals for PTB and OIML R 117
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Build-in length according to ISO 13359, the standard includes sizes up to DN 400
- Onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

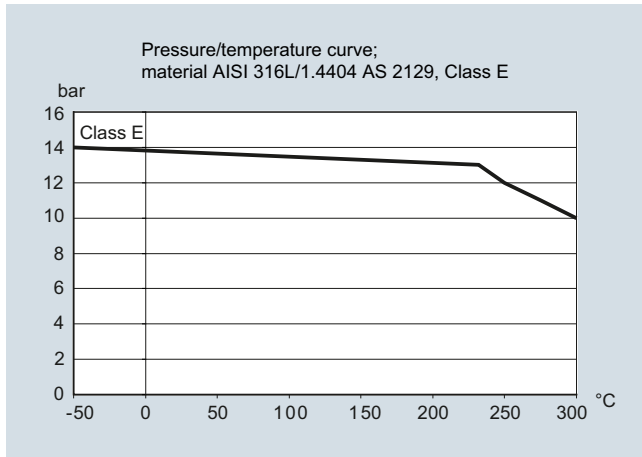
The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS 485.

Flow Measurement

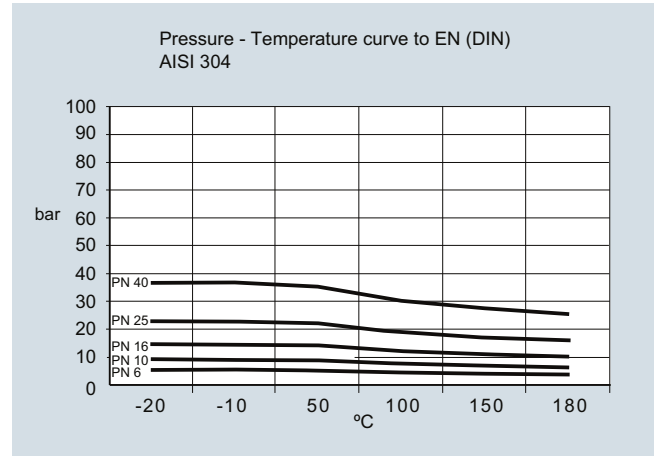
SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

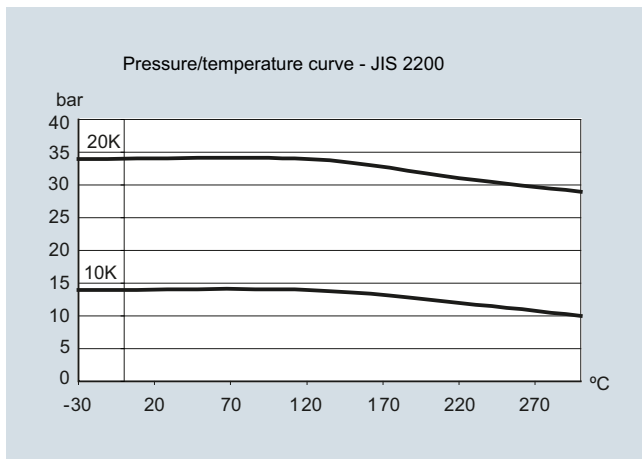
Pressure/temperature curve;
material AISI 316L/1.4404 AS 2129, Class E



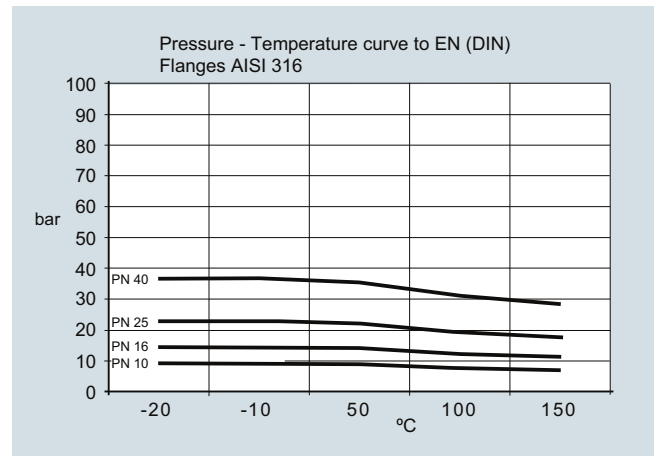
Pressure/temperature curve to EN (DIN) flanges AISI 304



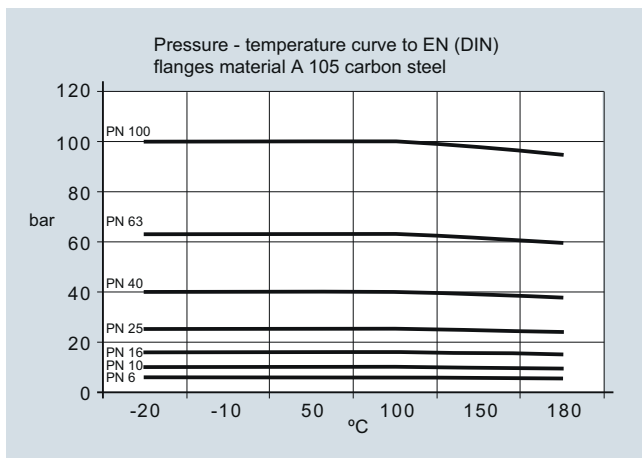
Pressure/temperature curve - JIS 2200



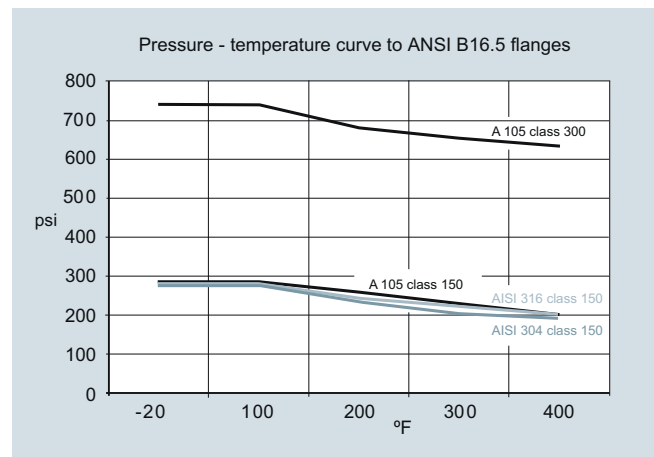
Pressure/temperature curve to EN (DIN) flanges AISI 316



Pressure/temperature curve to EN (DIN) flanges,
material A 105 carbon steel



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure-temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 9/6.

3

Technical specifications

Version	MAG 3100	MAG 3100 HT (High Temperature)
Product characteristic	Flexible product program	Flexible product program
Nominal size	DN 15 ... DN 2000 (½" ... 78")	DN 15 ... DN 300 (½" ... 12")
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	<ul style="list-style-type: none"> • DN 15 ... 65 (½" ... 2½"): 12.5 Hz/15 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz • DN 200 ... 1200 (8" ... 48"): 3.125 Hz/3.75 Hz • DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz/1.875 Hz 	<ul style="list-style-type: none"> • DN 15 ... 65 (½" ... 2½"): 12.5 Hz/15 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz/3.75 Hz
Process connection		
Flanges	EN 1092-1, raised face ¹⁾ (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) <ul style="list-style-type: none"> • DN 65 ... 2000 (2½" ... 78"): PN 6 (87 psi) • DN 200 ... 2000 (8" ... 78"): PN 10 (145 psi) • DN 65 ... 2000 (2½" ... 78"): PN 16 (232 psi) • DN 200 ... 600 (8" ... 24"): PN 25 (362 psi) • DN 15 ... 600 (½" ... 24"): PN 40 (580 psi) • DN 50 ... 300 (2" ... 12"): PN 63 (913 psi) • DN 25 ... 300 (1" ... 12"): PN 100 (1450 psi) ANSI B16.5 (~BS 1560), raised face <ul style="list-style-type: none"> • ½" ... 24": Class 150 (20 bar (290 psi)) • ½" ... 24": Class 300 (50 bar (725 psi)) AWWA C-207, flat face 28" ... 78": Class D (10 bar) AS 2129, raised face ½" ... 48": Table E AS 4087, raised face: <ul style="list-style-type: none"> • PN 16 (DN 50 ... 1200, 16 bar (232 psi)) • PN 21 (DN 50 ... 600, 21 bar (304 psi)) • PN 35 (DN 50 ... 600, 35 bar (508 psi)) JIS B 2220:2004 <ul style="list-style-type: none"> • K10 (1" ... 24") • K20 (1" ... 24") Other flanges and pressure ratings on request	EN 1092-1, raised face (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) <ul style="list-style-type: none"> • DN 15 ... 300 (½" ... 12"): PN 40 (580 psi) • DN 65 ... 300 (2½" ... 12"): PN 16 (232 psi) • DN 200 ... 300 (8" ... 12"): PN 10 (145 psi) • DN 200 ... 300 (8" ... 12"): PN 25 (362 psi) ANSI B16.5 (~BS 1560), raised face: <ul style="list-style-type: none"> • ½" ... 12": Class 150 (20 bar (290 psi)) • ½" ... 12": Class 300 (50 bar (725 psi)) AS 2129, raised face ½" ... 12": Table E Other flanges and pressure ratings on request
Rated operation conditions		
Ambient temperature (conditions also dependent on liner characteristics)		
<ul style="list-style-type: none"> • Standard sensor • Ex sensor 	-40 ... +100 °C (-40 ... +212 °F) -20 ... +60 °C (-4 ... +140 °F)	-40 ... +100 °C (-40 ... +212 °F) For medium temperature up to 150 °C (302 °F): -20 ... +60 °C (-4 ... +140 °F) For medium temperature 150 ... 180 °C (302 ... 356 °F): -20 ... +50 °C (-4 ... +122 °F)
<ul style="list-style-type: none"> • With compact transmitter <ul style="list-style-type: none"> - MAG 5000/6000²⁾ - MAG 6000 I - MAG 6000 I Ex 	-20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F)

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Version	MAG 3100	MAG 3100 HT (High Temperature)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	<ul style="list-style-type: none"> • Soft rubber 0.01 ... 100 bar (0.15 ... 1450 psi) • EPDM 0.01 ... 40 bar (0.15 ... 580 psi) • Linatex 0.01 ... 40 bar (0.15 ... 580 psi) • Ebonite 0.01 ... 100 bar (0.15 ... 1450 psi) • PTFE <ul style="list-style-type: none"> - DN ≤ 300 (≤ 12"): 0.3 ... 50 bar (4 ... 725 psi) - 350 ≤ DN ≤ 600 (14" ≤ DN ≤ 24"): 0.3 ... 40 bar (4 ... 580 psi) • PFA <ul style="list-style-type: none"> - DN 15 ... 150 (½" ... 6"): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi) 	<ul style="list-style-type: none"> • PTFE Teflon <ul style="list-style-type: none"> - DN 15 ... 300 (½" ... 12") (130/180 °C (266 °F/356 °F)): 0.3/0.6 ... 50 bar (4/8 ... 725 psi) (180 °C (356 °F)) • PFA <ul style="list-style-type: none"> - DN 15 ... 150 (½" ... 6"): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi)
Enclosure rating	IP67 to EN 60529/NEMA 4X/6, 1 mH ₂ O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.	IP67 to EN 60529/NEMA 4X/6, 1 mH ₂ O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Pressure drop at 3 m/s	As straight pipe	
Test pressure	1.5 x PN (where applicable)	
Mechanical load (vibration)	<ul style="list-style-type: none"> • 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 g RMS • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS 	<ul style="list-style-type: none"> • 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 g RMS • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS
Temperature of medium	<ul style="list-style-type: none"> • Soft rubber 0 ... +70 °C (32 ... 158 °F) • EPDM -10 ... +70 °C (14 ... 158 °F) • Linatex (rubber) -40 ... +70 °C (-40 ... +158 °F) (for temperatures below -20 °C (-4 °F) AISI 304 or 316 flanges must be used) • Ebonite 0 ... 95 °C (32 ... 203 °F) • PTFE -20 ... +100 °C (-4 ... +212 °F) • PFA -20 ... +100 °C (-4 ... +212 °F) 	<ul style="list-style-type: none"> • PTFE -20 ... +130 °C (-4 ... +266 °F) • PTFE -20 ... +180 °C (-4 ... +356 °F) Factory mounted grounding rings type E in SS and SS terminal box. Can only be used with remote transmitter. • PFA -20 ... +150 °C (-4 ... +300 °F)
EMC	2004/108/EC	2004/108/EC
Design		
Weight	See dimensional drawings	
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (150 µm/300 µm) or Stainless steel AISI 304/1.4301 flanges and carbon steel housing, with corrosion resistant two component epoxy coating (150 µm/300 µm) or Stainless steel AISI 316L/1.4404 flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (150 µm) or AISI 304/1.4301 flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316L/1.4404 flanges and housing, polished
Measuring pipe material	Stainless steel AISI 304/1.4301	AISI 304/1.4301
Electrode material	<ul style="list-style-type: none"> • Stainless steel AISI 316Ti/1.4571 • Hastelloy C276/2.4819 (PFA: Hastelloy C22/2.4602) • Platinum/Iridium • Titanium • Tantalum 	<ul style="list-style-type: none"> • AISI 316Ti/1.4571 • Hastelloy C276/2.4819 (PFA: Hastelloy C22/2.4602) • Platinum/Iridium • Titanium • Tantalum
Grounding electrode material	<ul style="list-style-type: none"> • Soft rubber, EPDM, Linatex, Ebonite: available with measuring electrodes in stainless steel AISI 316Ti/1.4571 or Hastelloy • PTFE: none • PFA: optional in Hastelloy, Tantalum or Platinum 	<ul style="list-style-type: none"> • PTFE: none • PFA: optional in Hastelloy, Tantalum or Platinum

Version	MAG 3100	MAG 3100 HT (High Temperature)
Design (continued)		
Terminal box (remote version only)	<ul style="list-style-type: none"> Standard fibre glass reinforced polyamide Option Stainless steel AISI 316/1.4436 Ex Stainless steel AISI 316/1.4436 	<ul style="list-style-type: none"> Standard fibre glass reinforced polyamide (max. 150 °C (302 °F)) Stainless steel AISI 316/1.4436 Ex Stainless steel AISI 316/1.4436
Cable entries	<ul style="list-style-type: none"> Remote installation 2 x M20 or 2 x 1/2" NPT Compact installation <ul style="list-style-type: none"> MAG 5000/MAG 6000: 4 x M20 or 4 x 1/2" NPT MAG 6000 I: 2 x M25 or 2 x 1/2" NPT (for supply/output) MAG 6000 I Ex: 2 x M25 or 2 x 1/2" NPT (for supply/output) 	<ul style="list-style-type: none"> Remote installation 2 x M20 or 2 x 1/2" NPT
Certificates and approvals		
Calibration		
<ul style="list-style-type: none"> Standard production calibration (default), calibration report shipped with sensor Special calibration 	<p>Zero-point, 2 x 25 % and 2 x 90 % (default)</p> <p>5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}</p> <p>10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}</p> <p>Matched-pair calibration: default, 5-point or 10-point</p>	<p>Zero-point, 2 x 25 % and 2 x 90 % (default)</p>
Conforms to	<p>PED (All EN1092-1 flanges conforms to PED) – 97/23/EC³⁾</p> <p>CRN</p>	<p>PED (All EN1092-1 flanges conforms to PED) – 97/23/EC³⁾</p> <p>CRN</p>
Material certificate EN 10204-3.1	Available when ordering together with meter ⁴⁾	Available when ordering together with meter ⁴⁾
Ex approvals ⁵⁾	<p>Ex sensors</p> <ul style="list-style-type: none"> ATEX 2 GD DN 15 ... 300: EEx d e ia IIC T4 - T6 DN 350 ... 2000: EEx e ia IIC T4 - T6 IEC Ex de ia IIC T3-T6 FM Class I/II/III, Div 1⁶⁾ FM Class I, Zone 1/2/1 CSA Class I, Zone 1 <p>Standard sensors</p> <ul style="list-style-type: none"> FM Class I, Div 2/Zone 2 CSA Class I, Div 2/Zone 2 	<p>Ex sensors</p> <ul style="list-style-type: none"> ATEX 2 GD DN 15 ... 300: EEx d e ia IIC T3 - T6 IEC Ex de ia IIC T3-T6 FM Class I/II/III, Div 1⁶⁾ FM Class I, Zone 1/2/1 CSA Class I, Zone 1 <p>Standard sensors</p> <ul style="list-style-type: none"> FM Class I, Div 2/Zone 2 CSA Class I, Div 2/Zone 2
Drinking water approvals	<p>EPDM lining:</p> <ul style="list-style-type: none"> WRAS (WRc, BS690 cold water, GB) NSF/ANSI Standard 61⁷⁾ (Cold water, US) ACS listed (F) DVGW W270 (D) Belgaqua (B) MCERTS (GB) (EPDM or PTFE lining with AISI 316 or Hastelloy electrodes) 	
Custody transfer (CT) (≤ DN2000) (only together with MAG 5000/6000 CT), order as special	<p>Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)</p> <p>Hot water pattern approval - PTB (Germany)</p> <p>Other media than water - OIML R 117 (Denmark)</p>	<p>Hot water pattern approval - PTB (Germany)</p>

Technical specification for transmitter - see transmitter pages.

¹⁾ PN 6-40: DN ≤ 600 type 01 (SORF); DN > 600 type 11 (WNRFF); PN 63-100: type 11 (WNRFF)

²⁾ With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F).

³⁾ For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the Pressure Equipment directive, also products sold into certain market sectors are excluded. These include:

a) Meters used in networks for the supply, distribution and discharge of water.

b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.

c) Meters used in the extraction of petroleum or gas, including christmas tree and manifold equipment.

d) Any meter mounted on a ship or mobile offshore platform. For further information on the PED standard and requirements see page 9/6.

⁴⁾ Has to be ordered with the meter. It is not possible to order the certificate afterwards.

⁵⁾ Not for sensors with 300 µm coating.

⁶⁾ Only with sensors sizes DN 15 ... 300 (1/2" ... 12") compact.

⁷⁾ Including Annex G

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data

Article No.

Sensor SITRANS F M MAG 3100

7 ME 6 3 1 0 -

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter

DN 15 (½") (PTFE and PFA liner)
 DN 25 (1")
 DN 40 (1½")
 DN 50 (2")
 DN 65 (2½")
 DN 80 (3")
 DN 100 (4")
 DN 125 (5")
 DN 150 (6")
 DN 200 (8")
 DN 250 (10")
 DN 300 (12")
 DN 350 (14")
 DN 400 (16")
 DN 450 (18")
 DN 500 (20")
 DN 600 (24")
 DN 700 (28")
 DN 750 (30") (AWWA and AS 2129 only)
 DN 800 (32")
 DN 900 (36")
 DN 1000 (40")
 DN 1050 (42") (AWWA only)
 DN 1100 (44") (AWWA only)
 DN 1200 (48")
 DN 1400 (54")
 DN 1500 (60")
 DN 1600 (66")
 DN 1800 (72")
 DN 2000 (78")

1 V
 2 D
 2 R
 2 Y
 3 F
 3 M
 3 T
 4 B
 4 H
 4 P
 4 V
 5 D
 5 K
 5 R
 5 Y
 6 F
 6 P
 6 Y
 7 D
 7 H
 7 M
 7 R
 7 U
 7 V
 8 B
 8 F
 8 K
 8 P
 8 T
 8 Y

Flange norm and pressure rating

EN 1092-1

PN 6 (DN 65 ... 2000 (2½" ... 78"))
 PN 10 (DN 200 ... 2000 (8" ... 78"))
 PN 16 (DN 65 ... 1200 (2½" ... 48"))
 PN 16, non-PED (DN 700 ... 2000 (28" ... 78"))
 PN 25 (DN 200 ... 600 (8" ... 24"))¹⁾
 PN 40 (DN 15 ... 600 (½" ... 24"))
 PN 63 (DN 50 ... 300 (2" ... 12"))
 PN 100 (DN 25 ... 300 (1" ... 12"))

ANSI B16.5

Class 150 (½" ... 24")
 Class 300 (½" ... 24")

AWWA C-207

Class D (28" ... 78")

AS

2129, table E
 4087, PN 16 (DN 50 ... 1200 (2" ... 48"))
 (Not PTFE and PFA)
 4087, PN 21 (DN 50 ... 600 (2" ... 24"))
 (Not PTFE and PFA)
 4087, PN 35 (DN 50 ... 600 (2" ... 24"))
 (Not PTFE and PFA)

JIS B 2220:2004

K10 (1" ... 24")
 K20 (1" ... 24")

A
 B
 C
 D
 E
 F
 G
 H
 J
 K
 L
 M
 N
 P
 Q
 R
 S

Selection and Ordering data

Article No.

Sensor SITRANS F M MAG 3100

7 ME 6 3 1 0 -

Flange material and coating

Carbon steel flanges ASTM A 105, 150 µm coating
 Stainless steel flanges, AISI 304/1.4301, 150 µm coating
 Stainless steel flanges and sensor body, AISI 316L/1.4404, polished
 Carbon steel flanges ASTM A 105, 300 µm coating
 Stainless steel flanges, AISI 304/1.4301, 300 µm coating

1
 2
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 4
 5

Liner material

Soft rubber
 EPDM
 PTFE (DN ≤ 300, PN ≤ 50 bar / ≤ 12", PN ≤ 725 psi),
 PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar /
 14" ≤ DN ≤ 24", PN ≤ 580 psi)
 Ebonite
 Linatex (PN ≤ 40 bar (580 psi) DN ≤ 600 (24"))
 PFA (DN 15 ... 150 (½" ... 6"))
 (PN ≤ 40 bar (580 psi))

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Electrode material

(Grounding electrodes not for PTFE liner or Pressure PN 100)

AISI 316Ti/1.4571 (not for PFA)
 Hastelloy C276/2.4819
 (PFA liner: Hastelloy C22/2.4602)
 Platinum (DN ≤ 300 (12")) (not ebonite liner)
 Titanium (not PFA liner) (DN ≤ 600 (24"))
 Tantalum (DN ≤ 600 (24")) (not ebonite liner)
 Hastelloy C22/2.4602 incl. grounding electrodes
 (only PFA)
 Platinum incl. grounding electrodes (only PFA)
 Tantalum incl. grounding electrodes (only PFA)

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 4
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 6
 7
 8

Transmitter with display

Standard sensor for remote transmitter (Order transmitter separately)
 Ex sensor for remote transmitter (Order transmitter separately)
 MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC
 MAG 6000 I Alu. 18 ... 30 V DC, Ex
 MAG 6000 I Alu. 115 ... 230 V, Ex
 MAG 6000 Polyamide, 11... 30 V DC / 11...24 V AC
 MAG 6000, Polyamide, 115 ... 230 V AC
 MAG 5000, Polyamide, 11... 30 V DC / 11...24 V AC
 MAG 5000, Polyamide, 115 ... 230 V AC

A
 B
 C
 D
 E
 H
 J
 K
 L

Communication

No communication, add-on possible
 HART
 PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)
 PROFIBUS DP Profile 3 (not for Ex)
 (only MAG 6000/MAG 6000 I)
 Modbus RTU/RS 485 (not for Ex)
 (only MAG 6000/MAG 6000 I)
 FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)

A
 B
 F
 G
 E
 J

Cable glands/terminal box

Metric: Polyamide terminal box or 6000 I compact
 ½" NPT: Polyamide terminal box or 6000 I compact
 Metric: SS terminal box (mandatory for stainless steel MAG 6000 Transmitter)
 ½" NPT: SS terminal box (mandatory for stainless steel MAG 6000 Transmitter)

1
 2
 3
 4

¹⁾ Under preparation

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data

Order code

Additional information

Please add “-Z” to Article No. and specify Order code(s) and plain text.

Material certificate according to EN 10204-3.1

C12

Factory certificate according to EN 10204-2.2

C14

Factory certificate according to EN 10204-2.1

C15

Special calibration

- 5-point calibration for DN 15 ... DN 200¹⁾
- 5-point calibration for DN 250 ... DN 600¹⁾
- 5-point calibration for DN 700 ... DN 1200¹⁾

D01

D02

D03

- 10-point calibration for DN 15 ... DN 200²⁾
- 10-point calibration for DN 250 ... DN 600²⁾
- 10-point calibration for DN 700 ... DN 1200²⁾

D06

D07

D08

- Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200

D11

- Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600

D12

- Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200

D13

- 5-point, matched-pair calibration for DN 15 ... DN 200¹⁾

D15

- 5-point, matched-pair calibration for DN 250 ... DN 600¹⁾

D16

- 5-point, matched-pair calibration for DN 700 ... DN 1200¹⁾

D17

- 10-point, matched-pair calibration for DN 15 ... DN 200²⁾

D18

- 10-point, matched-pair calibration for DN 250 ... DN 600²⁾

D19

- 10-point, matched-pair calibration for DN 700 ... DN 1200²⁾

D20

Tag name plate, stainless steel fixed with SS wire (add plain text)

Y17

Tag name plate, plastic (self adhesive)

Y18

Customer-specific converter setup

Y20

Sensor cables wired (specify cable Article No.)

Y40

Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.) (not for Ex)

Y41

Other postproduction requirements (add desired text)

Y99

Additional calibrations

- Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005

On request³⁾

- CT verification and authority seal according to: Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)

On request³⁾

- Customer-witnessed calibration Any of above calibration

On request³⁾

¹⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

²⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

³⁾ Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 3100

Description	Article No.
• English	A5E03005599
• German	A5E03086288
• Spanish	A5E03086291
• French	A5E03086290

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220



- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.

Communication module will be pre-mounted in the transmitter.

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data

Article No.

Sensor SITRANS F M
MAG 3100 HT (High Temperature)

7 ME 6 3 2 0 -

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter

DN 15 (½")
DN 25 (1")
DN 40 (1½")
DN 50 (2")
DN 65 (2½")
DN 80 (3")
DN 100 (4")
DN 125 (5")
DN 150 (6")
DN 200 (8")
DN 250 (10")
DN 300 (12")

1 V
2 D
2 R
2 Y
3 F
3 M
3 T
4 B
4 H
4 P
4 V
5 D

Flange norm and pressure rating

EN 1092-1
PN 10 (DN 200 ... 300 (8" ... 12"))
PN 16 (DN 65 ... 300 (2½" ... 12"))
PN 25 (DN 200 ... 300 (8" ... 12"))
PN 40 (DN 15 ... 300 (½" ... 12"))

B
C
E
F

ANSI B16.5

Class 150 (½" ... 12")
Class 300 (½" ... 12")

J
K

AS

2129, table E

M

Flange material

Carbon steel flanges ASTM A 105
Stainless steel flanges, AISI 304/1.4301
Stainless steel flanges and sensor body,
AISI 316L/1.4404, polished

1
2
3

Liner material

PTFE (130 °C (266 °F))
PTFE including type E protection rings
AISI 316/1.4436 (180 °C (356 °F))
PFA (150 °C (302 °F)) (DN 15 ... 150 (½" ... 6"))

2
3
7

Electrode material

AISI 316Ti/1.4571 (not for PFA)
Hastelloy C276/2.4819
(PFA liner: Hastelloy C22/2.4602)
Platinum
Titanium (not for PFA)
Tantalum
Hastelloy C22/2.4602 incl. grounding electrodes
(only PFA)
Platinum incl. grounding electrodes (only PFA)
Tantalum incl. grounding electrodes (only PFA)

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Transmitter with display

Standard sensor for remote transmitter (Order transmitter separately)
Ex sensor for remote transmitter (Order transmitter separately)
MAG 6000 I, Alu. 18 ... 90 V DC, 115 ... 230 V AC
MAG 6000 I, Alu. 18 ... 30 V DC, Ex
MAG 6000 I, Alu. 115 ... 230 V AC, Ex
MAG 6000, Polyamide, 11 ... 30 V DC/
11 ... 24 V AC
MAG 6000, Polyamide, 115 ... 230 V AC
MAG 5000, Polyamide, 11 ... 30 V DC/
11 ... 24 V AC
MAG 5000, Polyamide, 115 ... 230 V AC

A
B
C
D
E
H
J
K
L

Selection and Ordering data

Article No.

Sensor SITRANS F M
MAG 3100 HT (High Temperature)

7 ME 6 3 2 0 -

Communication

No communication, add-on possible
HART
PROFIBUS PA Profile 3
(only MAG 6000/MAG 6000 I)
PROFIBUS DP Profile 3
(only MAG 6000/MAG 6000 I)
Modbus RTU/RS 485
(only MAG 6000/MAG 6000 I)
FOUNDATION Fieldbus H1
(only MAG 6000/MAG 6000 I)

A
B
F
G
E
J

Cable glands/terminal box

Metric: Polyamide terminal box (PTFE 130 °C
(266 °F)) or 6000 I compact
½" NPT: Polyamide terminal box (PTFE 130 °C
(266 °F)) or 6000 I compact
Metric: SS terminal box (mandatory for Stainless
steel MAG 6000 Transmitter)
½" NPT: SS terminal box (mandatory for Stainless
steel MAG 6000 Transmitter)

1
2
3
4

Selection and Ordering data

Order code

Additional information

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Material certificate according to EN 10204-3.1

C12

Factory certificate according to EN 10204-2.2

C14

Factory certificate according to EN 10204-2.1

C15

Customer-specific converter setup

Y20

Tag name made, stainless steel fixed with SS wire
(add plain text)

Y17

Tag name plate, plastic (self adhesive)

Y18

Sensor cables wired (specify cable Article No.)

Y40

Sensor for remote transmitter's junction box potted to
IP68 with wired cable (specify cable Article No.)
(not for Ex)

Y41

Other postproduction requirements (add desired text)

Y99

Additional calibrations

• Matched pair - (Standard production calibration where
sensor and transmitter is calibrated together)

On request¹⁾

• Accredited Siemens Flow Instruments matched pair
Calibration acc. to ISO/IEC 17025: 2005

On request¹⁾

• Customer-specified calibration up to 10 points

On request¹⁾

• CT verification and authority seal according to:
Cold water pattern approval - DANAK TS 22.36.001,
PTB (Denmark and Germany)

On request¹⁾

• Customer-witnessed calibration
Any of above calibration

On request¹⁾

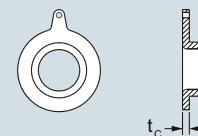
¹⁾ Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on <http://pi.khe.siemens.de/index.aspx?Nr=17460> and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Selection and Ordering data

MAG 3100 and MAG 3100 HT¹⁾ Type C Grounding and protection rings

1 pc. AISI 304 grounding and protection ring **type C** for all liners except PTFE and PFA

Type C



DN	PN 6 Article No.	PN 10 Article No.	PN 16 Article No.	PN 25 Article No.	PN 40 Article No.	AS 2129 Table E Article No.
DN 25 DN 40 DN 50					FDK:083N8361 FDK:083N8362 FDK:083N8344	FDK:083N8361 FDK:083N8362 FDK:083N8344
DN 65 DN 80 DN 100	FDK:083N8345 FDK:083N8347 FDK:083N8070		FDK:083N8345 FDK:083N8347 FDK:083N8025		FDK:083N8345 FDK:083N8347 FDK:083N8025	FDK:083N8346 FDK:083N8347 FDK:083N8025
DN 125 DN 150 DN 200	FDK:083N8071 FDK:083N8072 FDK:083N8074	FDK:083N8011	FDK:083N8071 FDK:083N8008 FDK:083N8011	FDK:083N8011	FDK:083N8071 FDK:083N8008 FDK:083N8075	FDK:083N8071 FDK:083N8008 FDK:083N8011
DN 250 DN 300 DN 350	FDK:083N8078 FDK:083N8080 FDK:083N8083	FDK:083N8013 FDK:083N8012 FDK:083N8039	FDK:083N8013 FDK:083N8012 FDK:083N8039	FDK:083N8013 FDK:083N8081 FDK:083N8084	FDK:083N8079 FDK:083N8082 FDK:083N8085	FDK:083N8013 FDK:083N8012 FDK:083N8039
DN 400 DN 450 DN 500	FDK:083N8099 FDK:083N8103 FDK:083N8107	FDK:083N8100 FDK:083N8103 FDK:083N8107	FDK:083N8100 FDK:083N8104 FDK:083N8108	FDK:083N8101 FDK:083N8104 FDK:083N8108	FDK:083N8102 FDK:083N8105 FDK:083N8109	FDK:083N8100 FDK:083N8104 FDK:083N8108
DN 600 DN 700 DN 750	FDK:083N8111 FDK:083N8300	FDK:083N8111 FDK:083N8294	FDK:083N8112 FDK:083N8294	FDK:083N8112		FDK:083N8113 FDK:083N8372
DN 800 DN 900 DN 1000	FDK:083N8303 FDK:083N8306 FDK:083N8309	FDK:083N8304 FDK:083N8307 FDK:083N8310	FDK:083N8304 FDK:083N8307 FDK:083N8310			FDK:083N8373 FDK:083N8396 FDK:083N8397
DN 1100 DN 1200 DN 1400		FDK:083N8367 FDK:083N8313 FDK:083N8468	FDK:083N8367 FDK:083N8313 FDK:083N8469			FDK:083N8367 FDK:083N8398
DN 1500 DN 1600 DN 1800 DN 2000	FDK:083N8471 FDK:083N8475 FDK:083N8479 FDK:083N8483	FDK:083N8472 FDK:083N8476 FDK:083N8480 FDK:083N8484	FDK:083N8473 FDK:083N8477 FDK:083N8481 FDK:083N8485			

¹⁾ Also for MAG 5100 W (7ME6520 > DN 300; and 7ME6580).

Size	ANSI Class 150 Article No.	Class 300 Article No.	JIS K10 Article No.	JIS K20 Article No.	Size	AWWA C-207 Article No.
1"	FDK:083N8361	FDK:083N8361	FDK:083N8361	FDK:083N8361	28"	FDK:083N8302
1½"	FDK:083N8362	FDK:083N8362	FDK:083N8362	FDK:083N8362	30"	FDK:083N8366
2"	FDK:083N8344	FDK:083N8344	FDK:083N8344	FDK:083N8344	32"	FDK:083N8305
2½"	FDK:083N8345	FDK:083N8345	FDK:083N8345	FDK:083N8345	36"	FDK:083N8308
3"	FDK:083N8347 FDK:083N8025	FDK:083N8347 FDK:083N8025	FDK:083N8347 FDK:083N8070	FDK:083N8347 FDK:083N8025	40"	FDK:083N8311
4"					42"	FDK:083N8394
5"	FDK:083N8071	FDK:083N8071	FDK:083N8071	FDK:083N8071	44"	FDK:083N8395
6"	FDK:083N8008	FDK:083N8073	FDK:083N8008	FDK:083N8008	48"	FDK:083N8314
8"	FDK:083N8011	FDK:083N8076	FDK:083N8011	FDK:083N8011	54"	FDK:083N8470
10"	FDK:083N8013	FDK:083N8079	FDK:083N8013	FDK:083N8079	60"	FDK:083N8474
12"	FDK:083N8012	FDK:083N8082	FDK:083N8012	FDK:083N8081	66"	FDK:083N8478
14"	FDK:083N8039	FDK:083N8085	FDK:083N8039	FDK:083N8039	72"	FDK:083N8482
16"	FDK:083N8100	FDK:083N8102	FDK:083N8100	FDK:083N8101	78"	FDK:083N8486
18"	FDK:083N8104	FDK:083N8106	FDK:083N8103	FDK:083N8104		
20"	FDK:083N8107	FDK:083N8110	FDK:083N8107	FDK:083N8108		
24"	FDK:083N8113	FDK:083N8114	FDK:083N8111	FDK:083N8112		

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data

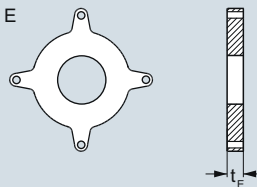
MAG 3100 and 3100 HT Type E grounding and protection ring

1 pc. AISI 316 grounding and protection ring **type E** for PTFE liners incl. straps and screws

Note:

For MAG 3100 HT High temperature version 7ME6320... for PTFE 180 °C (356 °C) versions - grounding ring type E is included and factory mounted.

Type E



DN	PN 6 Article No.	PN 10 Article No.	PN 16 Article No.	PN 25 Article No.	PN 40 Article No.
DN 15 DN 25 DN 40					FDK:083N8365 FDK:083N8271 FDK:083N8278
DN 50 DN 65 DN 80	FDK:083N8284 FDK:083N8288		FDK:083N8285 FDK:083N8289		FDK:083N8282 FDK:083N8286 FDK:083N8290
DN 100 DN 125 DN 150	FDK:083N8116 FDK:083N8120 FDK:083N8124		FDK:083N8117 FDK:083N8121 FDK:083N8125		FDK:083N8118 FDK:083N8122 FDK:083N8126
DN 200 DN 250 DN 300	FDK:083N8129 FDK:083N8135 FDK:083N8144	FDK:083N8130 FDK:083N8136 FDK:083N8144	FDK:083N8130 FDK:083N8137 FDK:083N8145	FDK:083N8131 FDK:083N8138 FDK:083N8146	FDK:083N8132 FDK:083N8139 FDK:083N8147
DN 350 DN 400 DN 450	FDK:083N8152 FDK:083N8160 FDK:083N8168	FDK:083N8153 FDK:083N8161 FDK:083N8169	FDK:083N8154 FDK:083N8162 FDK:083N8170	FDK:083N8155 FDK:083N8163 FDK:083N8171	FDK:083N8156 FDK:083N8164 FDK:083N8172
DN 500 DN 600	FDK:083N8177 FDK:083N8186	FDK:083N8178 FDK:083N8187	FDK:083N8179 FDK:083N8188	FDK:083N8180 FDK:083N8189	FDK:083N8181

Protection of PTFE liner use 2 pcs.

Earthing of PTFE lined flowmeter use 1 pc.

Size	ANSI			
	Class 150 Article No.	Class 300 Article No.	JIS K10 Article No.	JIS K20 Article No.
½"	FDK:083N8365	FDK:083N8365		
1"	FDK:083N8272	FDK:083N8272	FDK:083N8271	FDK:083N8271
1½"	FDK:083N8279	FDK:083N8279	FDK:083N8278	FDK:083N8278
2"	FDK:083N8283	FDK:083N8283	FDK:083N8282	FDK:083N8282
2½"	FDK:083N8287	FDK:083N8287	FDK:083N8285	FDK:083N8285
3"	FDK:083N8291	FDK:083N8292	FDK:083N8288	FDK:083N8289
4"	FDK:083N8118	FDK:083N8119	FDK:083N8116	FDK:083N8117
5"	FDK:083N8122	FDK:083N8123	FDK:083N8121	FDK:083N8122
6"	FDK:083N8126	FDK:083N8127	FDK:083N8125	FDK:083N8126
8"	FDK:083N8370	FDK:083N8133	FDK:083N8130	FDK:083N8370
10"	FDK:083N8140	FDK:083N8141	FDK:083N8137	FDK:083N8139
12"	FDK:083N8148	FDK:083N8149	FDK:083N8144	FDK:083N8146
14"	FDK:083N8157	FDK:083N8158	FDK:083N8152	FDK:083N8154
16"	FDK:083N8165	FDK:083N8166	FDK:083N8160	FDK:083N8165
18"	FDK:083N8173	FDK:083N8174	FDK:083N8169	FDK:083N8171
20"	FDK:083N8182	FDK:083N8183	FDK:083N8178	FDK:083N8180
24"	FDK:083N8190	FDK:083N8191	A5E32709738	A5E32710253

Protection of PTFE liner use 2 pcs.

Grounding of PTFE lined flowmeter use 1 pc.

AS2129, Table E

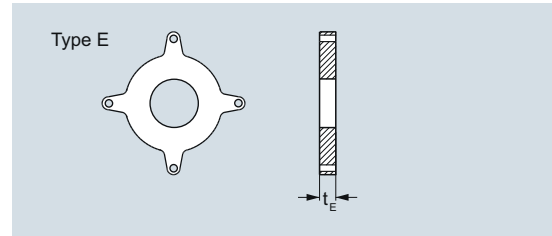
DN	Article No.
DN 15 DN 25 DN 40	FDK:083N8365 FDK:083N8272 FDK:083N8280
DN 50 DN 65 DN 80	FDK:083N8281 FDK:083N8284 FDK:083N8293
DN 100 DN 125 DN 150	FDK:083N8117 FDK:083N8121 FDK:083N8128
DN 200 DN 250 DN 300	FDK:083N8134 FDK:083N8143 FDK:083N8151
DN 350 DN 400 DN 450	FDK:083N8153 FDK:083N8161 FDK:083N8176
DN 500 DN 600	FDK:083N8185 A5E32710253

Protection of PTFE liner use 2 pcs.

Grounding of PTFE lined flowmeter use 1 pcs.

Selection and Ordering data**MAG 3100 and MAG 3100 HT type E grounding and protecting ring**

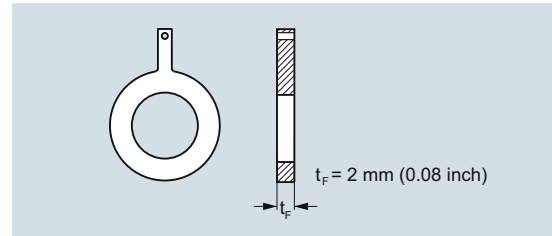
1 pc. Hastelloy C276 grounding and protection ring **type E** for PTFE liners incl. straps and screws



DN	PN 6	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Article No.	Article No.	Article No.		Article No.	Article No.
DN 15			FDK:083N8487	1/2"	FDK:083N8487	FDK:083N8487
DN 25			FDK:083N8488	1"	FDK:083N8489	FDK:083N8489
DN 40			FDK:083N8490	1 1/2"	FDK:083N8491	FDK:083N8491
DN 50			FDK:083N8492	2"	FDK:083N8493	FDK:083N8493
DN 65	FDK:083N8494	FDK:083N8495	FDK:083N8496	2 1/2"	FDK:083N8497	FDK:083N8497
DN 80	FDK:083N8498	FDK:083N8499	FDK:083N8500	3"	FDK:083N8501	FDK:083N8502
DN 100	FDK:083N8503	FDK:083N8504	FDK:083N8505	4"	FDK:083N8506	FDK:083N8507

Selection and Ordering data**MAG 3100 and MAG 3100 HT¹⁾ Grounding rings: Flat rings**

1 pc. **AISI 316** grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))



DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Article No.	Article No.	Article No.		Article No.	Article No.
DN 15			A5E01191969	1/2"	A5E01191968	
DN 25			A5E01150880	1"	A5E01150022	A5E01150378
DN 40			A5E01191952	1 1/2"	A5E01191961	
DN 50			A5E01150918	2"	A5E01151121	A5E01151194
DN 65		A5E01191940	A5E01191954	2 1/2"	A5E01191962	
DN 80		A5E01152876	A5E01152876	3"	A5E01152910	A5E01153422
DN 100		A5E01158875	A5E01159072	4"	A5E01159146	A5E01159628
DN 125		A5E01191941	A5E01191956	5"	A5E01191963	
DN 150		A5E01191943	A5E01191957	6"	A5E01191964	
DN 200	A5E01191951	A5E01191944	A5E01191958	8"	A5E01191965	
DN 250	A5E01191950	A5E01191946	A5E01191959	10"	A5E01191966	
DN 300	A5E01191949	A5E01191947	A5E01191960	12"	A5E01191967	

¹⁾ Also for MAG 5100 W (7ME6520 DN 40 ... 300)

Flow Measurement

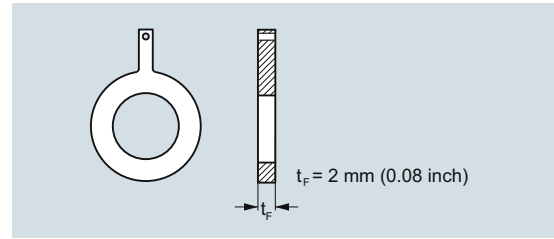
SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data

MAG 3100 and MAG 3100 HT Grounding rings : Flat rings

1 pc. **Hastelloy C276** grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))

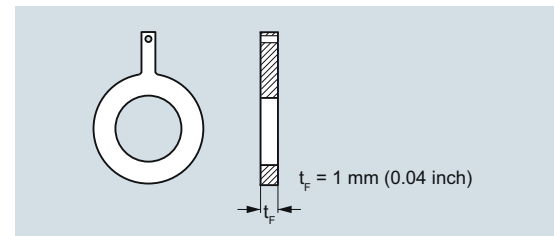


DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Article No.	Article No.	Article No.		Article No.	Article No.
DN 15			A5E01191981	1/2"	A5E01191989	
DN 25			A5E01150882	1"	A5E01150028	A5E01150379
DN 40			A5E01191982	1 1/2"	A5E01191990	
DN 50			A5E01150922	2"	A5E01151124	A5E01151197
DN 65		A5E01191971	A5E01191983	2 1/2"	A5E01191991	
DN 80		A5E01152889	A5E01152889	3"	A5E01152913	A5E01153424
DN 100		A5E01158886	A5E01159074	4"	A5E01159150	A5E01159629
DN 125		A5E01191973	A5E01191984	5"	A5E01191992	
DN 150		A5E01191974	A5E01191985	6"	A5E01191993	
DN 200	A5E01191978	A5E01191975	A5E01191986	8"	A5E01191994	
DN 250	A5E01191979	A5E01191976	A5E01191987	10"	A5E01191995	
DN 300	A5E01191980	A5E01191977	A5E01191988	12"	A5E01191996	

Selection and Ordering data

MAG 3100 and MAG 3100 HT Grounding rings : Flat rings

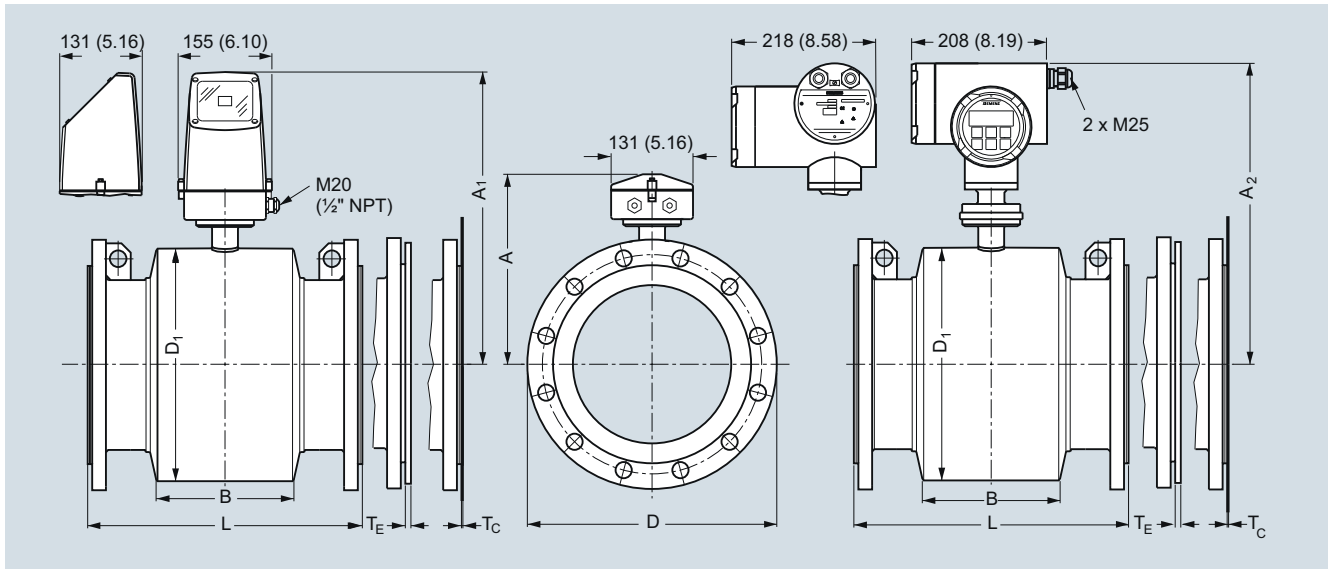
1 pc. **Tantalum** grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))



DN	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Article No.	Article No.		Article No.	Article No.
DN 15		A5E01192007	1/2"	A5E01192010	
DN 25		A5E01150883	1"	A5E01150030	A5E01150381
DN 40		A5E01192008	1 1/2"	A5E01192011	
DN 50		A5E01150926	2"	A5E01151129	A5E01151199
DN 65	A5E01192005	A5E01192009	2 1/2"	A5E01192012	
DN 80	A5E01152890	A5E01152890	3"	A5E01152916	A5E01153427
DN 100	A5E01158891	A5E01159076	4"	A5E01159156	A5E01159631

Dimensional drawings

MAG 3100 and MAG 3100 HT sensor with compact or remote transmitter



Dimensions in mm (inch)

Metric

DN	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾						ANSI 16.5	
						EN 1092-1-201 PN 6, 10	PN 16/ PN 16 non-PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
15	187	341	338	59	104	-	-	-	200	-	-	200	200
25	187	341	338	59	104	-	-	-	200	-	260	200	200
40	197	351	348	82	124	-	-	-	200	-	280	200	200
50	205	359	356	72	139	-	-	-	200	276	300	200	200
65	212	366	363	72	154	200	200/-	-	200	320	350	200	272
80	222	376	373	72	174	200	200/-	-	272 ³⁾	323	340	272 ³⁾	272 ³⁾
100	242	396	393	85	214	250	250/-	-	250	380	400	250	310
125	255	409	406	85	239	250	250/-	-	250	420	450	250	335
150	276	430	427	85	282	300	300/-	-	300	415	450	300	300
200	304	458	455	137	338	350	350/-	350	350	480	530	350	350
250	332	486	483	157	393	450	450/-	450	450	550	620	450	450
300	357	511	508	157	444	500	500/-	500	500	600	680	500	500
350	362	516	513	270	451	550	550/-	550	550	-	-	550	550
400	387	541	538	270	502	600	600/-	600	600	-	-	600	600
450	418	572	569	310	563	600	600/-	600	600	-	-	600	640
500	443	597	594	350	614	600	600/-	625	680	-	-	600	730
600	494	648	645	320	715	600	600/-	750	800	-	-	600	860
700	544	698	695	450	816	700	875/700	800	-	-	-	800	-
750	571	725	722	556	869	-	-/-	-	-	-	-	950	-
800	606	760	757	560	927	800	1000/800	900	-	-	-	900	-
900	653	807	804	630	1032	900	1125/900	1000	-	-	-	1100	-
1000	704	858	855	670	1136	1000	1250/1000	1100	-	-	-	1100	-
1050	704	858	855	670	1136	-	-/-	-	-	-	-	-	-
1100	755	904	901	770	1238	-	-/-	-	-	-	-	-	-
1200	810	964	961	792	1348	1200	1500/1200	1300	-	-	-	1400	-
1400	925	1079	1076	1000	1574	1400	-/1400	-	-	-	-	-	-
1500	972	1126	1123	1020	1672	1500	-/1500	-	-	-	-	-	-
1600	1025	1179	1176	1130	1774	1600	-/1600	-	-	-	-	-	-
1800	1123	1277	1274	1250	1974	1800	-/1800	-	-	-	-	-	-
2000	1223	1377	1374	1375	2174	2000	-/2000	-	-	-	-	-	-

1) 14.5 mm shorter with AISI terminal box (Ex and high temperature version)

2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

3) Not according to ISO 13359

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

DN	L ¹⁾				T _C ²⁾	T _E ²⁾	T _F ²⁾	T _T ²⁾	Wgt. ³⁾
[mm]	AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D	JIS K10	JIS K20	[mm]	[mm]	[mm]	[mm]	[kg]
15	200	-	200	200	-	6	2	1	4
25	200	-	200	200	1.2	6	2	1	5
40	200	-	200	240	1.2	6	2	1	8
50	200	-	200	240	1.2	6	2	1	9
65	200	-	200	272	1.2	6	2	1	11
80	200 ⁴⁾	-	200 ⁸⁾	272 ⁸⁾	1.2	6	2	1	12
100	250	-	250	310	1.2	6	2	1	16
125	250	-	250	335	1.2	6	2	-	19
150	300	-	300	300	1.2	6	2	-	27
200	350	-	350	350	1.2	8	2	-	40
250	450	-	450	450	1.2	8	2	-	60
300	500	-	500	500	1.6	8	2	-	80
350	550	-	550	550	1.6	8	-	-	110
400	600	-	600	600	1.6	10	-	-	125
450	600	-	600	640	1.6	10	-	-	175
500	600 ⁵⁾	-	600	680	1.6	10	-	-	200
600	600 ⁶⁾	-	600	800	1.6	10	-	-	287
700	700 ⁷⁾	700	-	-	2.0	-	-	-	330
750	750 ⁷⁾	750	-	-	2.0	-	-	-	360
800	800 ⁷⁾	800	-	-	2.0	-	-	-	450
900	900 ⁷⁾	900	-	-	2.0	-	-	-	530
1000	1000 ⁷⁾	1000	-	-	2.0	-	-	-	660
1050	-	1050	-	-	2.0	-	-	-	660
1100	-	1100	-	-	2.0	-	-	-	1140
1200	1200 ⁷⁾	1200	-	-	2.0	-	-	-	1180
1400	-	1400	-	-	2.0	-	-	-	1600
1500	-	1500	-	-	3.0	-	-	-	2460
1600	-	1600	-	-	3.0	-	-	-	2525
1800	-	1800	-	-	3.0	-	-	-	2930
2000	-	2000	-	-	3.0	-	-	-	3665

1) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

2) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C PTFE sensor), T_F = Flat type grounding rings

3) Weights are approx. (for PN 16) without transmitter

4) PN 35 DN 80 = 272 mm (not according to ISO 13359)

5) PN 35 DN 500 = 680 mm

6) PN 35 DN 600 = 750 mm

7) Not AS 4087 PN 21 or PN 35

8) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

MAG 3100 and MAG 3100 HT sensor with compact or remote transmitter

Imperial

Size	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾						ANSI 16.5/ASME B16.47 ³⁾		
						EN 1092-1-201						Class 150	Class 300	Class 600
						PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100			
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
½	7.36	13.31	13.25	2.32	4.09	-	-	-	7.87	-	-	7.87	7.87	-
1	7.36	13.31	13.25	2.32	4.09	-	-	-	7.87	-	10.24	7.87	7.87	11.02
1½	7.76	13.70	13.64	3.23	4.88	-	-	-	7.87	-	11.02	7.87	7.87	12.60
2	8.07	14.01	13.95	2.83	5.47	-	-	-	7.87	10.87	11.81	7.87	7.87	12.99
2½	8.35	14.29	14.23	2.83	6.06	7.87	7.87/-	-	7.87	12.60	13.78	7.87	10.71	on request
3	8.74	14.69	14.63	2.83	6.85	7.87	7.87/-	-	10.71 ⁴⁾	12.72	13.39	10.71 ⁴⁾	10.71 ⁴⁾	13.78
4	9.53	15.47	15.41	3.35	8.43	9.84	9.84/-	-	9.84	14.96	-	9.84	12.20	18.11
5	10.04	15.98	15.92	3.35	9.41	9.84	9.84/-	-	9.84	16.54	-	9.84	13.10	18.90
6	10.87	16.81	16.75	5.39	11.10	11.81	11.81/-	-	11.81	16.34	-	11.81	11.81	19.68
8	11.97	17.91	17.85	5.39	13.31	13.78	13.78/-	13.78	13.78	18.90	-	13.78	13.78	23.62
10	13.07	19.02	18.96	6.18	15.47	17.72	17.72/-	17.72	17.72	-	-	17.72	17.72	23.62
12	14.05	20.00	19.94	6.18	17.48	19.69	19.69/-	19.69	19.69	-	-	19.69	19.69	27.56
14	14.25	20.20	20.14	10.63	17.76	21.65	21.65/-	21.65	21.65	-	-	21.65	21.65	-
16	15.24	21.18	21.12	10.63	19.76	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-
18	16.45	22.40	22.34	12.20	22.16	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-
20	17.44	23.39	23.33	13.78	24.17	23.62	23.62/-	24.61	26.77	-	-	23.62	28.70	-
24	19.45	25.39	25.33	12.59	28.15	23.62	23.62/-	29.53	31.50	-	-	23.62	33.80	-
28	21.42	27.36	27.30	17.72	32.13	27.56	34.45/27.56	31.50	-	-	-	31.50	-	-
30	22.48	28.43	28.37	21.89	34.21	-	-/-	-	-	-	-	37.41	-	-
32	23.86	29.80	29.74	22.05	36.50	31.50	39.37/31.50	35.44	-	-	-	35.44	-	-
36	25.71	31.65	31.59	24.80	40.63	35.43	44.29/35.43	39.38	-	-	-	43.32	-	-
40	27.72	33.85	33.79	26.38	44.72	39.37	49.21/39.37	43.32	-	-	-	43.32	-	-
42	27.72	33.85	33.79	26.38	44.72	-	-/-	-	-	-	-	-	-	-
44	29.72	35.67	35.61	30.31	48.74	-	-/-	-	-	-	-	-	-	-
48	31.89	37.83	37.77	31.18	53.07	47.24	59.06/47.24	51.19	-	-	-	55.12	-	-
54	36.42	42.36	42.30	39.37	61.97	55.12	-/55.12	-	-	-	-	-	-	-
60	38.27	44.21	44.15	40.15	65.83	59.06	59.06/59.06	-	-	-	-	-	-	-
66	40.35	46.30	46.24	44.49	69.84	62.99	-/62.99	-	-	-	-	-	-	-
72	44.21	50.16	50.10	49.21	77.72	70.87	-/70.87	-	-	-	-	-	-	-
78	48.15	54.09	54.03	54.13	85.59	78.74	-/78.74	-	-	-	-	-	-	-

1) 0.571 inch shorter with AISI terminal box (Ex and high temperature version)

2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

3) ANSI 16.5 for DN ≤ 24"; ASME B16.47 for DN ≥ 28"

4) Not according to ISO 13359

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Size	L ¹⁾				T _C ²⁾	T _E ²⁾	T _F ²⁾	T _T ²⁾	Weight ³⁾
	AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D	JIS K10	JIS K20					
[in.]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[lb]
½	7.87	-	7.87	7.87	-	0.24	0.08	0.04	9
1	7.87	-	7.87	7.87	0.05	0.24	0.08	0.04	11
1½	7.87	-	7.87	9.44	0.05	0.24	0.08	0.04	17
2	7.87	-	7.87	9.44	0.05	0.24	0.08	0.04	20
2½	7.87	-	7.87	10.70	0.05	0.24	0.08	0.04	24
3	7.87 ⁴⁾	-	7.87 ⁸⁾	10.70 ⁸⁾	0.05	0.24	0.08	0.04	26
4	9.84	-	9.84	12.20	0.05	0.24	0.08	0.04	35
5	9.84	-	9.84	13.18	0.05	0.24	0.08	-	42
6	11.81	-	11.81	11.81	0.05	0.24	0.08	-	60
8	13.78	-	13.77	13.77	0.05	0.31	0.08	-	88
10	17.72	-	17.71	17.71	0.05	0.31	0.08	-	132
12	19.69	-	19.68	19.68	0.06	0.31	0.08	-	176
14	21.65	-	21.65	21.65	0.06	0.31	-	-	242
16	23.62	-	23.62	23.62	0.06	0.39	-	-	275
18	23.62	-	23.62	25.19	0.06	0.39	-	-	385
20	23.62 ⁵⁾	-	23.62	26.77	0.06	0.39	-	-	440
24	23.62 ⁶⁾	-	23.62	31.49	0.06	0.39	-	-	633
28	27.56 ⁷⁾	27.56	-	-	0.08	-	-	-	728
30	29.53 ⁷⁾	29.52	-	-	0.08	-	-	-	794
32	31.50 ⁷⁾	31.50	-	-	0.08	-	-	-	992
36	35.43 ⁷⁾	35.43	-	-	0.08	-	-	-	1168
40	39.37 ⁷⁾	39.37	-	-	0.08	-	-	-	1455
42	-	39.37	-	-	0.08	-	-	-	1455
44	-	43.31	-	-	0.08	-	-	-	2513
48	47.24 ⁷⁾	47.24	-	-	0.08	-	-	-	2601
54	-	55.12	-	-	0.12	-	-	-	3528
60	-	59.06	-	-	0.12	-	-	-	5423
66	-	63.00	-	-	0.12	-	-	-	5566
72	-	70.87	-	-	0.12	-	-	-	6460
78	-	78.74	-	-	0.12	-	-	-	8080

1) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

2) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 356 °F PTFE sensor),

T_F = Flat type grounding rings

3) Weights are for ANSI 150 without transmitter

4) PN 35 DN 80 = 10.70 inch

5) PN 35 DN 500 = 26.77 inch

6) PN 35 DN 600 = 29.53 inch

7) Not AS 4087 PN 21 or PN 35

8) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

Overview



The SITRANS F M MAG 3100 P is designed to meet the most common specifications within chemical and process industries.

Benefits

- DN 15 to DN 300 (½" to 12")
- Included in Quick Ship Program (delivery time see PIA LCP)
- Most used flowmeter in the chemical and process industries with PTFE/PFA liner and Hastelloy electrodes
- Excellent chemical resistance
- Full scope of global approvals for hazardous areas:
 - ATEX, FM, CSA, IECEx
 - 24 V and 115/230 V Ex compact and remote
 - intrinsically safe ia analog output
- Comprehensive self-diagnostic for error indication and error logging
- Fully welded construction provides a ruggedness that suits the toughest applications and environments
- Easy commissioning, the SENSORPROM unit automatically updates settings.
- MAG 6000 I full NAMUR compliance
 - compliant with NE 21, NE 32, NE 43, NE 53 and NE 70

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Chemical industry
- Process industry
- Pulp and paper
- Industrial waste water

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- High temperature sensor for applications with temperatures up to 150 °C (302 °F)
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges, and CRN
- Build-in length according to ISO 13359
- Onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

Mode of operation

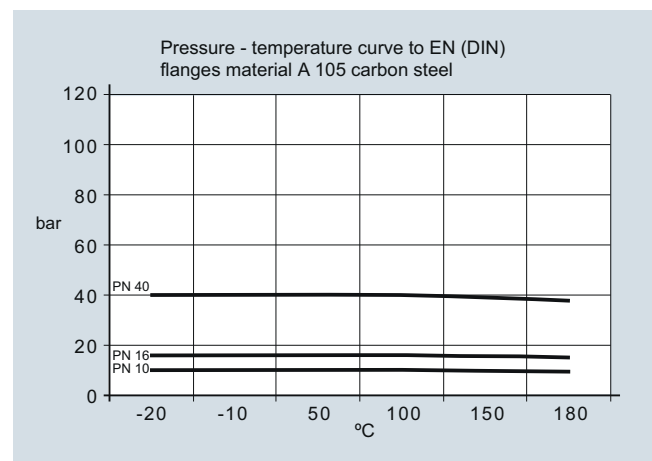
The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

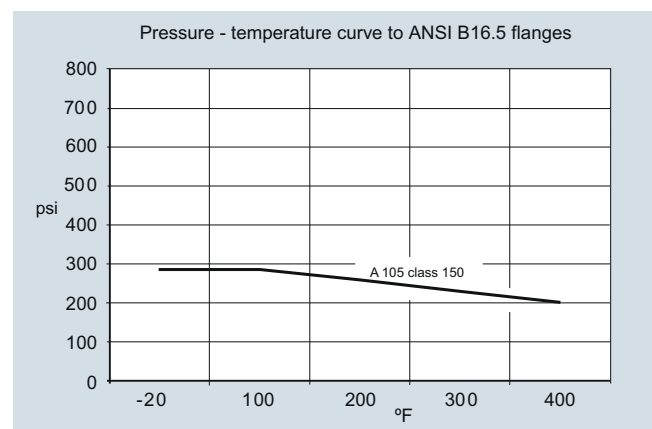
The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS 485.

Pressure/temperature curve to EN (DIN) flanges, material A 105 carbon steel



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure-temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 9/6.

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 P

Technical specifications

Product characteristic	Chemical and process industry-oriented (Included in Quick Ship Program (delivery time see PIA LCP))
Nominal size	<ul style="list-style-type: none"> • PTFE: DN 15 ... 300 (½" ... 12") • PFA: DN 15 ... 150 (½" ... 6")
Measuring principle	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	<ul style="list-style-type: none"> • DN 15 ... 65 (½" ... 2½"): 12.5 Hz/15 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz/3.75 Hz
Process connection	
Flanges	EN 1092-1, raised face ¹⁾ (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) <ul style="list-style-type: none"> • DN 15 ... 50 (½" ... 2"): PN 40 (580 psi) • DN 65 ... 300 (2½" ... 12"): PN 16 (232 psi) • DN 200 ... 300 (8" ... 12"): PN 10 (145 psi) ANSI B16.5 (~BS 1560), raised face <ul style="list-style-type: none"> • ½" ... 12": Class 150 (20 bar (290 psi))
Rated operation conditions	
Ambient temperature (conditions also dependent on liner characteristics)	
• Standard sensor	-40 ... +100 °C (-40 ... +212 °F)
• Ex sensor	-20 ... +60 °C (-4 ... +140 °F)
• With compact transmitter	
- MAG 5000/6000 ²⁾	-20 ... +60 °C (-4 ... +140 °F)
- MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)
- MAG 6000 I Ex	-20 ... +60 °C (-4 ... +140 °F)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	<ul style="list-style-type: none"> • PTFE Teflon <ul style="list-style-type: none"> - DN 15 ... 300 (½" ... 12") : 0.3 ... 40 bar (4 ... 580 psi) • PFA <ul style="list-style-type: none"> - DN 15 ... 150 (½" ... 6"): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi)
Enclosure rating	IP67 to EN 60529/NEMA 4X/6, 1 mH ₂ O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont. (not for Ex)
Pressure drop at 3 m/s	As straight pipe
Test pressure	1.5 x PN (where applicable)
Mechanical load (vibration)	<ul style="list-style-type: none"> • 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 g RMS • Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/6000 I Ex mounted transmitter: 1.14 g RMS
Temperature of medium	<ul style="list-style-type: none"> • PTFE -20 ... +130 °C (-4 ... +266 °F) • PFA -20 ... +150 °C (-4 ... +302 °F)
EMC	2004/108/EC

Design	
Weight	See dimensional drawings
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm)
Measuring pipe material	AISI 304/1.4301
Electrode material	PTFE: Hastelloy C276/2.4819 PFA: Hastelloy C22/2.4602
Grounding electrode material	PTFE: No grounding electrodes PFA: Hastelloy
Terminal box (remote version only)	<ul style="list-style-type: none"> • Standard fibre glass reinforced polyamide • Option Stainless steel AISI 316/1.4436 • Ex sensor: Stainless steel AISI 316/1.4436
Cable entries	<ul style="list-style-type: none"> • Remote installation 2 x M20 or 2 x ½" NPT • Compact installation <ul style="list-style-type: none"> - MAG 5000/MAG 6000: 4 x M20 or 4 x ½" NPT - MAG 6000 I: 2 x M25 or 2 x ½" NPT (for supply/output) - MAG 6000 I Ex: 2 x M25 or 2 x ½" NPT (for supply/output)
Certificates and approvals	
Calibration	
Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %
Conforms to	PED (All EN1092-1 flanges conforms to PED) – 97/23/EC ³⁾ CRN
Material certificate EN 10204 3.1	Available when ordering together with meter ⁴⁾
Ex approvals	Ex sensor <ul style="list-style-type: none"> • ATEX 2G D: DN 15 ... 300: EEx de ia IIC T3 - T6 • IEC Ex de ia IIC T3-T6 • FM Class I/II/III, Div 1 (compact only) • FM Class I, Zone 1/21 • CSA Class I, Zone 1/21 Standard sensor <ul style="list-style-type: none"> • FM Class I, Div 2 • CSA Class I, Div 2
Custody transfer (CT) (only together with MAG 5000/6000 CT), order as special	Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)
1) DN ≤ 600 type 01 (SORF); DN > 600 type 11 (WNRFF)	
2) With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F)	
3) For further information on the PED standard and requirements, see page 9/6.	
4) Has to be ordered with the meter. It is not possible to order the certificate afterwards.	

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100 P (Short delivery time)	7 ME 6 3 4 0 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	■ ■ ■ ■ ■ - ■ ■ ■ ■ ■
Diameter	
DN 15 (½")	◆ 1 V
DN 25 (1")	◆ 2 D
DN 40 (1½")	◆ 2 R
DN 50 (2")	◆ 2 Y
DN 65 (2½")	◆ ¹⁾ 3 F
DN 80 (3")	◆ 3 M
DN 100 (4")	◆ 3 T
DN 125 (5")	◆ 4 B
DN 150 (6")	◆ 4 H
DN 200 (8")	◆ 4 P
DN 250 (10")	◆ 4 V
DN 300 (12")	◆ 5 D
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 300 (8" ... 12"))	◆ B
PN 16 (DN 65 ... 300 (2½" ... 12"))	◆ C
PN 40 (DN 15 ... 50 (½" ... 2"))	◆ F
ANSI B16.5	
Class 150 (½" ... 12")	◆ J
Flange material	
Carbon steel flanges ASTM A 105	◆ 1
Liner material	
PTFE (130 °C (266 °F))	◆ 3
PFA (150 °C (302 °F)) (DN 15 ... 150 (½" ... 6"))	◆ 7
Electrode material	
Hastelloy C	◆ 2
Hastelloy C incl. grounding electrode, (only PFA)	◆ 6
Transmitter	
Standard sensor for remote transmitter (Order transmitter separately)	◆ A
Ex sensor for remote transmitter (Order transmitter separately)	◆ B
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	◆ C
MAG 6000 I, Aluminum, 18 ... 30 V DC, Ex	◆ D
MAG 6000 I, Aluminum, 115 ... 230 V AC, Ex	◆ E
MAG 6000 I (NAMUR), Aluminum, 18 ... 30 V DC, 115 ... 230 V AC	◆ F
MAG 6000 I (NAMUR), Aluminum, 18 ... 30 V DC, 115 ... 230 V AC, Ex	◆ G
MAG 6000, Polyamide, 11 ... 30 V DC/11 ... 24 V AC	◆ H
MAG 6000, Polyamide, 115 ... 230 V AC	◆ J
MAG 5000, Polyamide, 11 ... 30 V DC/11 ... 24 V AC	◆ K
MAG 5000, Polyamide, 115 ... 230 V AC	◆ L
Communication	
No communication, add-on possible	◆ A
HART	◆ B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	◆ F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	◆ G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	◆ E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	◆ J
Cable glands/terminal box	
Metric: Polyamide terminal box or 6000 I compact	◆ 1
½" NPT: Polyamide terminal box or 6000 I compact	◆ 2
Metric SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	◆ 3
½" NPT SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	◆ 4

1) Only for ANSI flanges

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Material certificate according to EN 10204-3.1	C12¹⁾
Factory certificate according to EN 10204-2.1	C15
Factory certificate according to EN 10204-2.2	C14
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific converter setup	Y20
Power cable wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box IP68 with wired cable (specify cable Article No.) (not for ATEX)	Y41
Other postproduction requirements (add desired text)	Y99
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	On request²⁾
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request²⁾
• Customer-specified calibration up to 10 points	On request²⁾
• CT verification and authority seal according to: PTB (Denmark and Germany)	On request²⁾
• Customer-witnessed calibration Any of above calibration	On request²⁾

1) Under preparation.

2) Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on <http://pi.khe.siemens.de/index.aspx?Nr=17460> and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 3100 P

Description	Article No.
• English	A5E03005599
• German	A5E03086288
• Spanish	A5E03086291
• French	A5E03086290

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at: <http://www.siemens.com/flowdocumentation>

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.

Communication module will be pre-mounted in the transmitter.

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Please use online Product selector to get latest updates.

Product selector link: www.pia-selector.automation.siemens.com

Flow Measurement

SITRANS F M

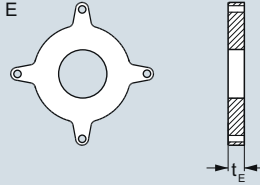
Flow sensor MAG 3100 P

Selection and Ordering data

MAG 3100 P Type E grounding and protection ring

1 pc. **AISI 316** grounding and protection rings **type E** for PTFE liners incl. straps and screws

Type E



DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	ANSI ¹⁾	Class 150 Article No.
DN 15			FDK:083N8365	½"	FDK:083N8365
DN 25			FDK:083N8271	1"	FDK:083N8272
DN 40			FDK:083N8278	1½"	FDK:083N8279
DN 50			FDK:083N8282	2"	FDK:083N8283
DN 65		FDK:083N8285		2½"	FDK:083N8287
DN 80		FDK:083N8289		3"	FDK:083N8291
DN 100		FDK:083N8117		4"	FDK:083N8118
DN 125		FDK:083N8121		5"	FDK:083N8122
DN 150		FDK:083N8125		6"	FDK:083N8126
DN 200	FDK:083N8130	FDK:083N8130		8"	FDK:083N8370
DN 250	FDK:083N8136	FDK:083N8137		10"	FDK:083N8140
DN 300	FDK:083N8144	FDK:083N8145		12"	FDK:083N8148

Protection of PTFE liner use 2 pcs.

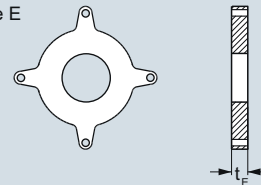
Earthing of PTFE lined flowmeter use 1 pc.

Selection and Ordering data

MAG 3100 P type E grounding and protecting ring

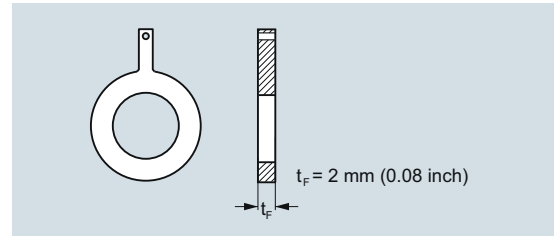
1 pc. **Hastelloy C276** grounding and protection ring **type E** for PTFE liners incl. straps and screws

Type E

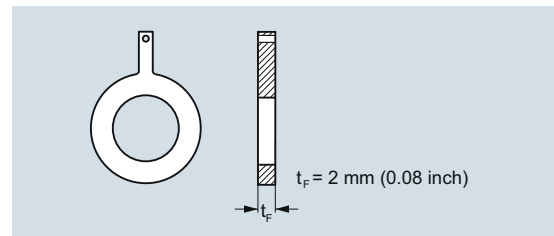


DN	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15		FDK:083N8487	½"	FDK:083N8487
DN 25		FDK:083N8488	1"	FDK:083N8489
DN 40		FDK:083N8490	1½"	FDK:083N8491
DN 50		FDK:083N8492	2"	FDK:083N8493
DN 65	FDK:083N8495		2½"	FDK:083N8497
DN 80	FDK:083N8499		3"	FDK:083N8501
DN 100	FDK:083N8504		4"	FDK:083N8506

¹⁾ For dimensions of MAG 3100 P see table on page 3/90

Selection and Ordering data**MAG 3100 P Grounding rings: Flat rings**1 pc. **AISI 316** grounding **flat ring** for all liners

DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15			A5E01191968	1/2"	A5E01191969
DN 25			A5E01150880	1"	A5E01150022
DN 40			A5E01191952	1 1/2"	A5E01191961
DN 50		A5E01191940	A5E01150918	2"	A5E01151121
DN 65		A5E01152876		2 1/2"	A5E01191962
DN 80				3"	A5E01152910
DN 100		A5E01158875		4"	A5E01159146
DN 125		A5E01191941		5"	A5E01191963
DN 150		A5E01191943		6"	A5E01191964
DN 200	A5E01191951	A5E01191944		8"	A5E01191965
DN 250	A5E01191950	A5E01191946		10"	A5E01191966
DN 300	A5E01191949	A5E01191947		12"	A5E01191967

Selection and Ordering data**MAG 3100 P Grounding rings : Flat rings**1 pc. **Hastelloy C276** grounding **flat ring**

DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15			A5E01191981	1/2"	A5E01191989
DN 25			A5E01150882	1"	A5E01150028
DN 40			A5E01191982	1 1/2"	A5E01191990
DN 50		A5E01191971	A5E01150922	2"	A5E01151124
DN 65		A5E01152889		2 1/2"	A5E01191991
DN 80				3"	A5E01152913
DN 100		A5E01158886		4"	A5E01159150
DN 125		A5E01191973		5"	A5E01191992
DN 150		A5E01191974		6"	A5E01191993
DN 200	A5E01191978	A5E01191975		8"	A5E01191994
DN 250	A5E01191979	A5E01191976		10"	A5E01191995
DN 300	A5E01191980	A5E01191977		12"	A5E01191996

1) For dimensions of MAG 3100 P see table on page 3/90

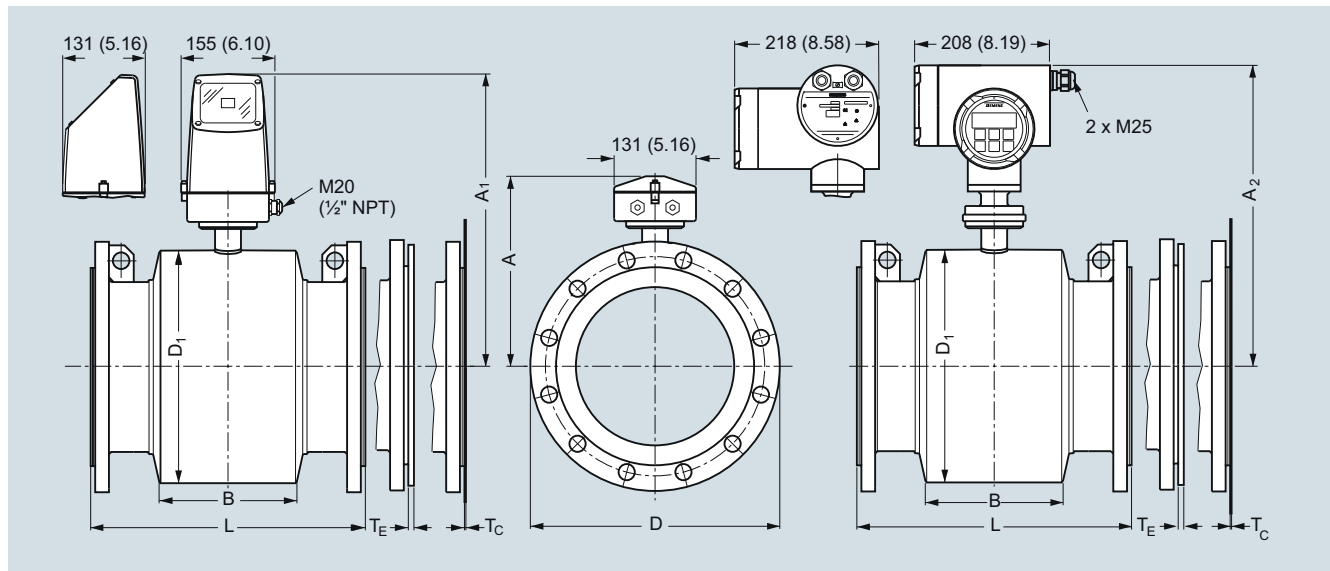
Flow Measurement

SITRANS F M

Flow sensor MAG 3100 P

Dimensional drawings

MAG 3100 P sensor with compact or remote transmitter



Dimensions in mm (inch)

Metric

DN	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾			ANSI 16.5 Class 150	T _E ³⁾	T _F ³⁾	Wgt. ⁴⁾
						EN 1092-1-201 PN 10	PN 16	PN 40				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	
15	187	341	338	59	104	-	-	200	200	6	2	4
25	187	341	338	59	104	-	-	200	200	6	2	5
40	197	351	348	82	124	-	-	200	200	6	2	8
50	205	359	356	72	139	-	-	200	200	6	2	9
65	212	369	366	72	154	-	200/-	-	200	6	2	11
80	222	376	373	72	174	-	200/-	-	272 ⁵⁾	6	2	12
100	242	396	393	85	214	-	250/-	-	250	6	2	16
125	255	409	406	85	239	-	250/-	-	250	6	2	19
150	276	430	427	85	282	-	300/-	-	300	6	2	27
200	304	458	455	137	338	350	350/-	-	350	8	2	40
250	332	486	483	157	393	450	450/-	-	450	8	2	60
300	357	511	508	157	444	500	500/-	-	500	8	2	80

1) 14.5 mm shorter with AISI terminal box (Ex and high temperature version)

2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

3) T_E = Type E grounding ring, T_F = Flat type grounding rings

4) Weights are approx. (for PN 16) without transmitter

5) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

MAG 3100 P sensor with compact or remote transmitter

Imperial

Size	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾				T _C ³⁾	T _E ³⁾	T _F ³⁾	Wgt. ⁴⁾
						EN 1092-1-201		ANSI 16.5					
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	PN 10	PN 16	PN 40	Class 150	[inch]	[inch]	[inch]	[lb]
½	7.36	13.4	13.34	2.32	4.09	-	-	7.87	7.87	-	0.24	0.08	9
1	7.36	13.4	13.34	2.32	4.09	-	-	7.87	7.87	0.05	0.24	0.08	11
1½	7.76	13.8	13.74	3.23	4.88	-	-	7.87	7.87	0.05	0.24	0.08	17
2	8.07	14.1	14.04	2.83	5.47	-	-	7.87	7.87	0.05	0.24	0.08	20
2½	8.35	14.4	14.34	2.83	6.06	-	7.87/-	-	7.87	0.05	0.24	0.08	24
3	8.74	14.8	14.74	2.83	6.85	-	7.87/-	-	10.71 ⁵⁾	0.05	0.24	0.08	26
4	9.53	15.6	15.54	3.35	8.43	-	9.84/-	-	9.84	0.05	0.24	0.08	35
5	10.04	16.1	16.04	3.35	9.41	-	9.84/-	-	9.84	0.05	0.24	0.08	42
6	10.87	16.9	16.84	3.35	11.10	-	11.81/-	-	11.81	0.05	0.24	0.08	60
8	11.97	18.0	17.94	5.39	13.31	13.78	13.78/-	-	13.78	0.05	0.31	0.08	88
10	13.07	19.1	19.04	6.18	15.47	17.72	17.72/-	-	17.72	0.05	0.31	0.08	132
12	14.05	20.1	20.04	6.18	17.48	19.69	19.69/-	-	19.69	0.06	0.31	0.08	176

¹⁾ 0.571 inch shorter with AISI terminal box (Ex and high temperature version)

²⁾ When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

³⁾ T_C = Type C grounding ring, T_E = Type E grounding ring, T_F = Flat type grounding rings

⁴⁾ Weights are for ANSI 150 without transmitter

⁵⁾ Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Overview



The SITRANS F M MAG 5100 W is an electromagnetic flow sensor designed to meet ground water, drinking water, waste water, sewage or sludge applications.

Benefits

- DN 15 to DN 1200 / 2000 (½" to 48"/78")
- Stock program of MAG 5100 W secures short delivery time
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA, AS and JIS.
- NBR Hard Rubber and Ebonite Hard Rubber liner for all water applications
- EPDM liner with drinking water approvals
- Hastelloy integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design (Article No. 7ME6520, DN 15 to 300 mm (½" to 12")).
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Custody transfer approvals
- Build-in length according to ISO 13359; the standard includes sizes up to DN 400.
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed so patented in-situ verification can be conducted. Using SENSORPROM fingerprint.
- Custody Transfer option for water billing, with type approval after OIML R 49 and verified according to MI-001 - OD inlet/OD outlet installation
 - pattern approval OIML R 49 (Denmark, Germany)
 - conforms to ISO 4064 and EN 14154 for mechanical flowmeters
 - PTB K7.2
- FM Fire Service Meter (Class Number 1044) for automatic fire protection systems
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Simple onsite or factory upgrade to IP68/NEMA 6P of a standard sensor
- MCERTS approval for UK environmental market

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Water abstraction
- Water treatment
- Water distribution network (leak detection management)
- Custody transfer water meters
- Irrigation
- Waste water treatment
- Filtration plant (e.g. reverse osmosis and ultra filtration)
- Industrial water applications

Mode of operation

The flow measuring principle is based on Faradays law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAG 5000, MAG 6000 or MAG 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems, e.g. HART, DeviceNet, PROFIBUS DP and PA, FOUNDATION Fieldbus H1 or Modbus RTU/RS 485.

Technical specifications

Product characteristic	MAG 5100 W (7ME6520) Mainly for the European market EPDM or NBR lining	MAG 5100 W (7ME6580) Mainly for the non-European market Ebonite lining
Design and nominal size	Coned sensor (octagon liner): DN 15 ... 40 (½" ... 1½") Coned sensor: DN 50 ... 300 (2" ... 12") Full bore sensor: DN 350 ... 1200 (14" ... 48")	Full bore sensor: DN 25 ... 2000 (1" ... 78")
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50/60 Hz)	DN 15 ... 65 (½" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz DN 200 ... 300 (8" ... 12"): 3.125 Hz/3.75 Hz DN 350 ... 1200 (14" ... 48"): 1.5625 Hz/1.875 Hz	DN 25 ... 65 (1" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz DN 200 ... 1200 (8" ... 48"): 3.125 Hz/3.75 Hz DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz/1.875 Hz
Process connection		
Flanges ¹⁾		
• EN 1092-1	PN 10 (145 psi): DN 200 ... 300 (8" ... 12") Flat face PN 10 (145 psi): DN 350 ... 1200 (14" ... 48") Raised face ²⁾ PN 16 (232 psi): DN 50 ... 300 (2" ... 12") Flat face ³⁾ PN 16 (232 psi): DN 350 ... 1200 (14" ... 48") Raised face PN 40 (580 psi): DN 15 ... 40 (½" ... 1½") Flat face	Raised face ³⁾ (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) PN 6 (87 psi): DN 1400 ... 2000 (54" ... 78") PN 10 (145 psi): DN 200 ... 2000 (8" ... 78") PN 16 (232 psi): DN 65 ... 600 (2½" ... 24") PN 40 (580 psi): DN 25 ... 50 (1" ... 2")
• ANSI B16.5	Class 150: ½" ... 12" flat face; 14" ... 24" raised face	Class 150: 1" ... 24"; raised face
• AWWA C-207	Class D: 28" ... 48", flat face	Class D: 28" ... 78", flat face
• AS4087	PN 16 (DN 50 ... 1200), (2" ... 48") 16 bar (232 psi)	PN 16 (DN 50 ... 1200), (2" ... 48") 16 bar (232 psi)
• JIS B 2220:2004	-	K10 (1" ... 24")
Rated Operation conditions		
Ambient temperature		
• Sensor	-40 ... +70 °C (-40 ... +158 °F)	-20 ... +70 °C (-4 ... +158 °F)
• With compact transmitter MAG 5000/6000 ⁴⁾	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
Operating pressure (Abs) [abs. bar] (Maximum operating pressure depending on flange standard, decreases with increasing operating temperature)	DN 15 ... 40 (½" ... 1½"): 0.01 ... 40 bar (0.15 ... 580 psi) DN 50 ... 300 (2" ... 12"): 0.03 ... 20 bar (0.44 ... 290 psi) DN 350 ... 1200 (14" ... 48"): 0.01 ... 16 bar (0.15 ... 232 psi)	DN 25 ... 50 (1" ... 2"): 0.01 ... 40 bar (0.15 ... 580 psi) DN 65 ... 1200 (2½" ... 48"): 0.01 ... 16 bar (0.15 ... 232 psi) DN 1400 ... 2000 (54" ... 78"): 0.01 ... 10 bar (0.15 ... 145 psi)
Enclosure rating		
• Standard	IP67 to EN 60529/NEMA 4X/6 (1 mH ₂ O for 30 min)	IP67 to EN 60529/NEMA 4X/6 (1 mH ₂ O for 30 min)
• Option	IP68 to EN 60529/NEMA 6P (10 mH ₂ O continuously)	IP68 to EN 60529/NEMA 6P (10 mH ₂ O continuously)
Pressure drop	DN 15 and 25 (½" and 1"): Max. 20 mbar (0.29 psi) at 1 m/s (3 ft/s). DN 40 ... 300 (1½" ... 12"): Max 25 mbar (0.36 psi) at 3 m/s (10 ft/s) DN 350 ... 1200 (14" ... 48"): Insignificant	Insignificant
Test pressure	1.5 x PN (where applicable) FM Fire Service: 2 x PN	1.5 x PN (where applicable)
Mechanical load (vibration)	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 g RMS Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 g RMS Sensor with compact MAG 6000 I mounted transmitter: 1.14 g RMS	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 g RMS Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 g RMS Sensor with compact MAG 6000 I mounted transmitter: 1.14 g RMS

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Product characteristic	Mainly for the European market (7ME6520)	Mainly for the non-European market (7ME6580)
	EPDM or NBR lining	Ebonite lining
Medium conditions		
Temperature of medium		
• NBR	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM/NBR (MI-001)	0.1 ... 30 °C (32 ... 76 °F)	-
• Ebonite	-	-10 ... +70 °C (14 ... 158 °F)
EMC	2004/108/EC	2004/108/EC
Design		
Material		
• Housing and flanges	Carbon steel ASTM A 105, with corrosion-resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4, according to ISO 12944-2	Carbon steel ASTM A 105, with corrosion-resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4, according to ISO 12944-2
• Measuring pipe	Stainless steel AISI 304/1.4301	Stainless steel AISI 304/1.4301
• Electrode	Hastelloy C	Hastelloy C
• Grounding electrode	Hastelloy C	Hastelloy C
• Terminal box	Fibre glass reinforced polyamide	Fibre glass reinforced polyamide
Certificates and approvals		
Calibration		
• Standard production calibration (default), calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %	Zero-point, 2 x 25 % and 2 x 90 %
• Special calibration	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max} Matched-pair calibration: default, 5-point or 10-point	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max} Matched-pair calibration: default, 5-point or 10-point
Material certificate EN 10204 3.1	Available when ordering together with meter ⁵⁾	Available when ordering together with meter ⁵⁾
Custody Transfer (only together with MAG 6000 CT)	OIML R 49 pattern approval cold water (Denmark and Germany): DN 50 ... 300 (2" ... 12") MI-001 cold water (EU): DN 50 ... 300 (2" ... 12") PTB K7.2: Chilled water energy metering DN 50-300 (order as special) Certificate number: 22 76.10 02	
Drinking water approvals	EPDM liner: NSF/ANSI Standard 61 ⁶⁾ (Cold water, US) WRAS (WRc, BS6920 cold water, GB) ACS (F), DVGW W270 (D) Belgaqua (B)	NSF/ANSI Standard 61 ⁶⁾ (Cold water, US) WRAS (WRc, BS6920 cold water, GB)
Other approvals	MCERTS PED conforming: All EN1092-1 flanges and ANSI Class 150 (< DN 300 (<12")) – 97/23/EC ⁷⁾ CRN (DN 50 - DN 1200 (2" ... 48")) CSA Class I, Div 2 ⁸⁾ FM Class I, Div 2 ⁸⁾ FM Fire Service Approval according to class 1044 ⁸⁾⁹⁾ VdS: Extinguishing systems DN 50 ... 300	PED conforming: All EN1092-1 flanges (≤ DN 600 (≤ 24") – 97/23/EC ⁷⁾ CRN CSA Class I, Div 2 ⁸⁾ FM Class I, Div 2 ⁸⁾

¹⁾ DN 750, DN 1050 and DN 1100 (30", 42" and 44") not available with EN 1092-1 (PN 10 and PN 16) and AS4087 flanges

²⁾ Type 01 (SORF)

³⁾ DN ≤ 600 type 01 (SORF); DN > 600 type 11

⁴⁾ With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F); with compact MI-001 approved transmitter -25 ... +55 °C (-13 ... +131 °F)

⁵⁾ Has to be ordered with the meter. It is not possible to order the certificate afterwards.

⁶⁾ Including Annex G

⁷⁾ For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the directive, also products sold into certain market sectors are excluded. These include:

a) Meters used in networks for the supply, distribution and discharge of water.

b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.

c) Meters used in the extraction of petroleum or gas, including Christmas tree and manifold equipment.

d) Any meter mounted on a ship or mobile offshore platform. For further information on the PED standard and requirements see page 9/6.

⁸⁾ Not for sensors with 300 µm coating.

⁹⁾ DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges

MAG 5100 W (7ME6520) with MAG 6000 CT (Revenue program) MI-001

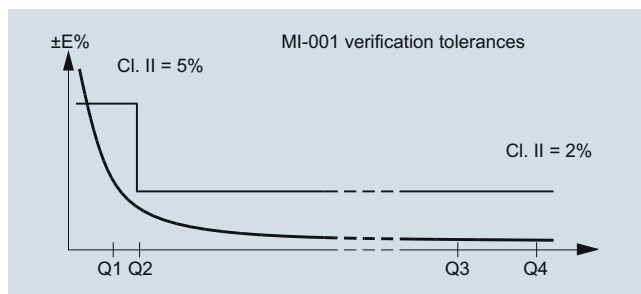
MAG 5100 W CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 5100 W MI-001 verified and labeled products are a Class II approval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 300 (Article No. 7ME6520).

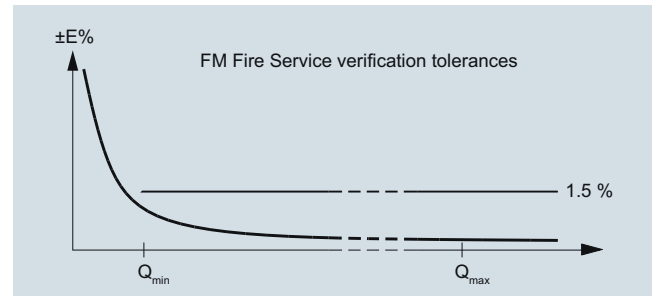
The MID certification is obtained as a modul B + D module approval according to the above mentioned directive.

Module B : Type approval according to OIML R 49

Module D : Quality insurance approval of production

**MAG 5100 W (7ME6520) with MAG 5000/MAG 6000 or MAG 6000 CT for Fire Service applications**

MAG 5100 W (7ME6520) is FM Fire Service approved for automatic fire protection systems. The approval is applicable for the sizes DN 50, DN 80, DN 100, DN 150, DN 200, DN 250 and DN 300 (2", 3", 4", 6", 8", 10" and 12") with ANSI B16.5 Class 150 flanges. The FM Fire Service approved product can be ordered via the Z-options P20, P21 and P22.



Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

MAG 5100 W (7ME6520) MI-001 verified and labeled products at a given Q3 and Q3/Q4 = 1.25 and Q2/Q1 = 1.6 measuring ranges see table below:

Order code: P11	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m³/h]	16	25	40	63	100	160	250	400	630
Q2 [m³/h]	1.02	1.6	2.6	4.03	6.4	10.24	16	25.6	40.32
Q1 [m³/h]	0.64	1.00	1.60	2.52	4.0	6.4	10.0	16.0	25.2

Order code: P12	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m³/h]	16	25	40	63	100	160	250	400	630
Q2 [m³/h]	0.41	0.63	1.02	1.6	2.54	4.06	6.35	10.2	16.0
Q1 [m³/h]	0.25	0.40	0.63	1.00	1.59	2.54	3.97	6.35	10.0

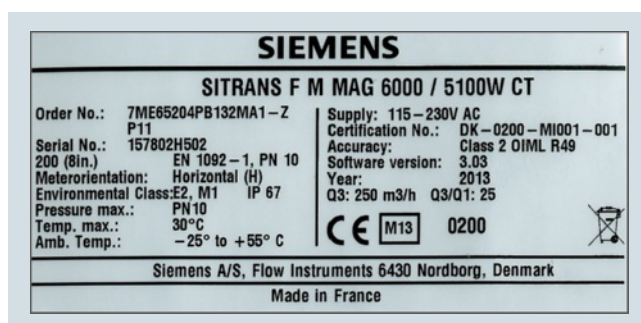
Order code: P13	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m³/h]	16	25	40	63	100	160	250	400	630
Q2 [m³/h]	0.32	0.50	0.80	1.20	2.00	3.20	5.0	8.0	12.6
Q1 [m³/h]	0.20	0.31	0.50	0.75	1.25	2.00	3.13	5.0	7.90

Order code: P16	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600
Q2 [m³/h]	0.40	0.63	1.00	1.60	2.50	4.00	6.3	10.0	16.0
Q1 [m³/h]	0.25	0.39	0.63	1.00	1.56	2.50	3.94	6.3	10.0

Order code: P17	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	200	200	200	200	200	200	200	200	200
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600
Q2 [m³/h]	0.32	0.50	0.80	1.28	2.00	3.20	5.0	8.0	12.8
Q1 [m³/h]	0.20	0.32	0.50	0.80	1.25	2.00	3.15	5.0	8.0

Order code: P18	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	250	250	250	250	250	250	250	250	250
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600
Q2 [m³/h]	0.26	0.40	0.64	1.02	1.60	2.56	4.0	6.4	10.24
Q1 [m³/h]	0.16	0.25	0.40	0.64	1.00	1.60	2.52	4.0	6.4

The Label is placed on the side of the encapsulation. An example of the product label is shown below:



OIML R 49/MI-001 approvals valid for:


- DN 50 to 300 mm (2" to 12")
- Horizontal installation
- Compact or remote with max. 3 m cable
- Power supply 115/230 V AC


Other restrictions may apply (see certificate).

Special OIML / MI-001 settings:

- Unit: m³
- Qmax: Q3
- Digital output: Frequency

For other factory settings, see Operating Instructions.

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 5100 W	7 ME 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications	 - 2
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Diameter	
DN 15 (½")	1 V
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 65 (2½")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
DN 125 (5")	4 B
DN 150 (6")	4 H
DN 200 (8")	4 P
DN 250 (10")	4 V
DN 300 (12")	5 D
DN 350 (14")	5 K
DN 400 (16")	5 R
DN 450 (18")	5 Y
DN 500 (20")	6 F
DN 600 (24")	6 P
DN 700 (28")	6 Y
DN 750 (30")	7 D
DN 800 (32")	7 H
DN 900 (36")	7 M
DN 1000 (40")	7 R
(42")	7 U
(44")	7 V
DN 1200 (48")	8 B
Flange norm and pressure rating	
to EN 1092-1	
PN 10 (DN 200 ... 1200/8" ... 48")	B
PN 16 (DN 50 ... 1200/2" ... 48")	C
PN 16, non PED (DN 700 ... 1200/28" ... 48")	D
PN 40 (DN 15 ... 40/½" ... 1½")	F
to ANSI B16.5	
class 150 (½" ... 24")	J
to AWWA C-207	
Class D (28" ... 48")	L
to AS 4087	
PN 16 (DN 50 ... 1200/2" ... 48")	N
Flange material and coating	
Carbon steel flanges ASTM A 105, 150 µm coating	1
Carbon steel flanges ASTM A 105, 300 µm coating	4
Liner material	
EPDM	2
NBR Hard Rubber	3
Transmitter	
Sensor for remote transmitter (Order transmitter separately)	A
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC	H
MAG 6000, Polyamid, 115 ... 230 V AC	J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC	K
MAG 5000, Polyamid, 115 ... 230 V AC	L
MAG 6000 CT, Polyamid, 115 ... 230 V AC	M

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 5100 W	7 ME 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications	 - 2
Communication	
None	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric/Polyamid terminal box or 6000 I compact	1
½" NPT/Polyamid terminal box or 6000 I compact	2
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Material certificate according to EN 10204-3.1	C12
Factory certificate according to EN 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
FP2E marking (only France)	C17
Special calibration	
• 5-point calibration for DN 15 ... DN 200 ¹⁾	D01
• 5-point calibration for DN 250 ... DN 600 ¹⁾	D02
• 5-point calibration for DN 700 ... DN 1200 ¹⁾	D03
• 10-point calibration for DN 15 ... DN 200 ²⁾	D06
• 10-point calibration for DN 250 ... DN 600 ²⁾	D07
• 10-point calibration for DN 700 ... DN 1200 ²⁾	D08
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200	D11
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600	D12
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200	D13
• 5-point, matched-pair calibration for DN 15 ... DN 200 ¹⁾	D15
• 5-point, matched-pair calibration for DN 250 ... DN 600 ¹⁾	D16
• 5-point, matched-pair calibration for DN 700 ... DN 1200 ¹⁾	D17
• 10-point, matched-pair calibration for DN 15 ... DN 200 ²⁾	D18
• 10-point, matched-pair calibration for DN 250 ... DN 600 ²⁾	D19
• 10-point, matched-pair calibration for DN 700 ... DN 1200 ²⁾	D20
Approval/Verification ³⁾ (MI-001 : DN 50 ... 300 (compact only), EN 1092-1 PN10 and PN16 flanges with MAG 6000 CT) ⁴⁾	
• Without verification according to OIML R 49	P10
• MI-001 Q3/Q1 = 25	P11
• MI-001 Q3/Q1 = 63	P12
• MI-001 Q3/Q1 = 80	P13
• MI-001 Q3/Q1 = 160	P16
• MI-001 Q3/Q1 = 200	P17
• MI-001 Q3/Q1 = 250	P18
FM Fire Service Approval (with ANSI B16.5 Class 150 flanges)	
• DN 50, DN 80 and DN 100 (2", 3" and 4")	P20
• DN 150 and DN 200 (6" and 8")	P21
• DN 250 and DN 300 (10" and 12")	P22
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self-adhesive)	Y18
Customer-specific converter setup	Y20
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.)	Y41
Other postproduction requirements (add desired text)	Y99

Selection and Ordering data	Order code
Additional Calibrations	
Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025:2005	On request⁵⁾
Customer-witnessed calibration Any of above calibration	On request⁵⁾
1) 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max}	
2) Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max}	
3) For more details and references of the ranges please see the tables on page 3/96.	
4) For remote version submit Product Variation Request.	
5) Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on http://pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)	

Operating instructions for SITRANS F M MAG 5100 W


Description	Article No.
• English	A5E03063678
• German	A5E03376527
• Spanish	A5E00376529
• French	A5E03376521
• Chinese	A5E03376501

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I transmitters and sensors are delivered compact mounted from factory.

Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 5100 W	7 ME 6 5 8 0 -	Sensor SITRANS F M MAG 5100 W	7 ME 6 5 8 0 -
Hastelloy electrodes, carbon steel flanges, Non EU water markets		Hastelloy electrodes, carbon steel flanges, Non EU water markets	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Diameter		Transmitter with display	
DN 25 (1")	2 D	Sensor for remote transmitter (Order transmitter separately)	A
DN 40 (1½")	2 R	MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	H
DN 50 (2")	2 Y	MAG 6000, Polyamid, 115 ... 230 V AC	J
DN 65 (2½")	3 F	MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	K
DN 80 (3")	3 M	MAG 5000, Polyamid, 115 ... 230 V AC	L
DN 100 (4")	3 T	Communication	
DN 125 (5")	4 B	No communication, add-on possible	A
DN 150 (6")	4 H	HART	B
DN 200 (8")	4 P	PROFIBUS PA Profile 3 (only MAG 6000)	F
DN 250 (10")	4 V	PROFIBUS DP Profile 3 (only MAG 6000)	G
DN 300 (12")	5 D	Modbus RTU/RS 485 (only MAG 6000)	E
DN 350 (14")	5 K	FOUNDATION Fieldbus H1 (only MAG 6000)	J
DN 400 (16")	5 R	Cable glands/terminal box	
DN 450 (18")	5 Y	Metric	1
DN 500 (20")	6 F	½" NPT	2
DN 600 (24")	6 P		
DN 700 (28")	6 Y		
DN 750 (30")	7 D		
DN 800 (32")	7 H		
DN 900 (36")	7 M		
DN 1000 (40")	7 R		
(42")	7 U		
(44")	7 V		
DN 1200 (48")	8 B		
DN 1400 (54")	8 F		
DN 1500 (60")	8 K		
DN 1600 (66")	8 P		
DN 1800 (72")	8 T		
DN 2000 (78")	8 Y		
Flange norm and pressure rating			
to EN 1092-1			
PN 6 (DN 1400 ... 2000 (54" ... 78")) ¹⁾	A		
PN 10 (DN 200 ... 2000 (8" ... 78")) ¹⁾	B		
PN 16 (DN 65 ... 600 (2½" ... 24"))	C		
PN 16, non-PED (DN 700 ... 2000 (28" ... 78"))	D		
PN 40 (DN 25 ... 50 (1" ... 2"))	F		
to ANSI B16.5			
class 150 (1" ... 24")	J		
to AWWA C-207			
Class D (28" ... 78") ¹⁾	L		
to AS 4087			
PN 16 (DN 50 ... 1200 (2" ... 48"))	N		
to JIS			
B 2220:2004 K10 (1" ... 24")	R		
Flange material and coating			
Carbon steel flanges ASTM A 105, 150 µm coating	1		
Carbon steel flanges ASTM A 105, 300 µm coating	4		
Liner material			
Ebonite Hard Rubber	4		
Electrode material			
Hastelloy	2		

¹⁾ DN 1400 to DN 2000 (54" to 78") do not conform to PED or CRN.

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Selection and Ordering data

Order code

Additional information

Please add “-Z” to Article No. and specify Order code(s) and plain text.

Material certificate according to EN 10204-3.1

C12¹⁾

Factory certificate according to EN 10204-2.2

C14

Factory certificate according to EN 10204-2.1

C15

Special calibration

• 5-point calibration for DN 15 ... DN 200²⁾

D01

• 5-point calibration for DN 250 ... DN 600²⁾

D02

• 5-point calibration for DN 700 ... DN 1200²⁾

D03

• 10-point calibration for DN 15 ... DN 200³⁾

D06

• 10-point calibration for DN 250 ... DN 600³⁾

D07

• 10-point calibration for DN 700 ... DN 1200³⁾

D08

• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200

D11

• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600

D12

• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200

D13

• 5-point, matched-pair calibration for DN 15 ... DN 200²⁾

D15

• 5-point, matched-pair calibration for DN 250 ... DN 600²⁾

D16

• 5-point, matched-pair calibration for DN 700 ... DN 1200²⁾

D17

• 10-point, matched-pair calibration for DN 15 ... DN 200³⁾

D18

• 10-point, matched-pair calibration for DN 250 ... DN 600³⁾

D19

• 10-point, matched-pair calibration for DN 700 ... DN 1200³⁾

D20

Tag name plate, stainless steel fixed with SS wire

Y17

Tag name plate, plastic (self-adhesive)

Y18

Customer-specific converter setup

Y20

Sensor cables wired (specify cable Article No.)

Y40

Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.)

Y41

Other postproduction requirements (add desired text)

Y99

¹⁾ Under preparation

²⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

³⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS F M MAG 5100 W

Description

Article No.

• German

A5E03376527

• English

A5E03063678

• French

A5E03376521

• Spanish

A5E03376529

• Chinese

A5E03376501

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

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<http://www.siemens.com/flowdocumentation>

Accessories

Description

Article No.

Potting kit for terminal box of flow sensors for IP68/NEMA 6P

◆ **FDK:085U0220**



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

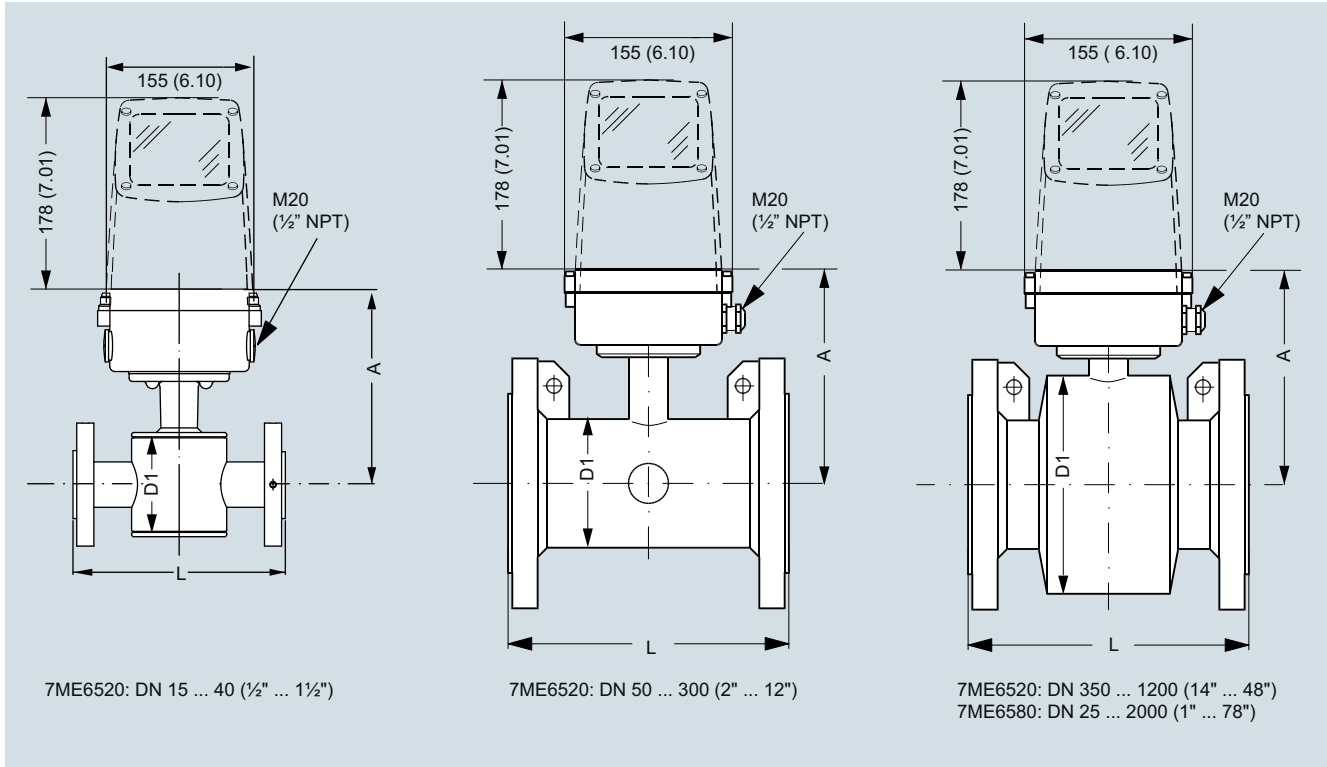
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place.

Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link: www.pia-selector.automation.siemens.com

Dimensional drawings



7ME6520 NBR or EPDM liner						7ME6580 Ebonite liner					
Nominal size		A		D1		A		D1		L	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	1/2	177	7.0	77	3.0	-	-	-	-	200	7.9
25	1	187	7.4	96	3.8	187	7.4	104	4.09	200	7.9
40	1 1/2	202	8.0	127	5.0	197	7.8	124	4.88	200	7.9
50	2	188	7.4	76	3.0	205	8.1	139	5.47	200	7.9
65	2 1/2	194	7.6	89	3.5	212	8.3	154	6.06	200	7.9
80	3	200	7.9	102	4.0	222	8.7	174	6.85	200	7.9
100	4	207	8.1	114	4.5	242	9.5	214	8.43	250	9.8
125	5	217	8.5	140	5.5	255	10.0	239	9.41	250	9.8
150	6	232	9.1	168	6.6	276	10.9	282	11.1	300	11.8
200	8	257	10.1	219	8.6	304	12.0	338	13.31	350	13.8
250	10	284	11.2	273	10.8	332	13.1	393	15.47	450	17.7
300	12	310	12.2	324	12.8	357	14.1	444	17.48	500	19.7
350	14	382	15.0	451	17.8	362	14.3	451	17.76	550	21.7
400	16	407	16.0	502	19.8	387	15.2	502	19.76	600	23.6
450	18	438	17.2	563	22.2	418	16.5	563	22.16	600	23.6
500	20	463	18.2	614	24.2	443	17.4	614	24.17	600	23.6
600	24	514	20.2	715	28.2	494	19.4	715	28.15	600	23.6
700	28	564	22.2	816	32.1	544	21.4	816	32.13	700	27.6
750	30	591	23.3	869	34.2	571	22.5	869	34.21	750	29.5
800	32	616	24.3	927	36.5	606	23.9	927	36.5	800	31.5
900	36	663	26.1	1032	40.6	653	25.7	1032	40.63	900	35.4
1000	40	714	28.1	1136	44.7	704	27.7	1136	44.72	1000	39.4
	42	714	28.1	1136	44.7	704	27.7	1136	44.72	1000	39.4
	44	765	30.1	1238	48.7	755	29.7	1238	48.74	1100	43.3
1200	48	820	32.3	1348	53.1	810	31.9	1348	53.07	1200	47.2
1400	54	-	-	-	-	925	36.4	1574	65.94	1400	55.1
1500	60	-	-	-	-	972	38.2	1672	65.83	1500	59.1
1600	66	-	-	-	-	1025	40.4	1774	75.39	1600	63
1800	72	-	-	-	-	1123	44.2	1974	77.72	1800	70.9
2000	78	-	-	-	-	1223	48.1	2174	85.59	2000	78.7

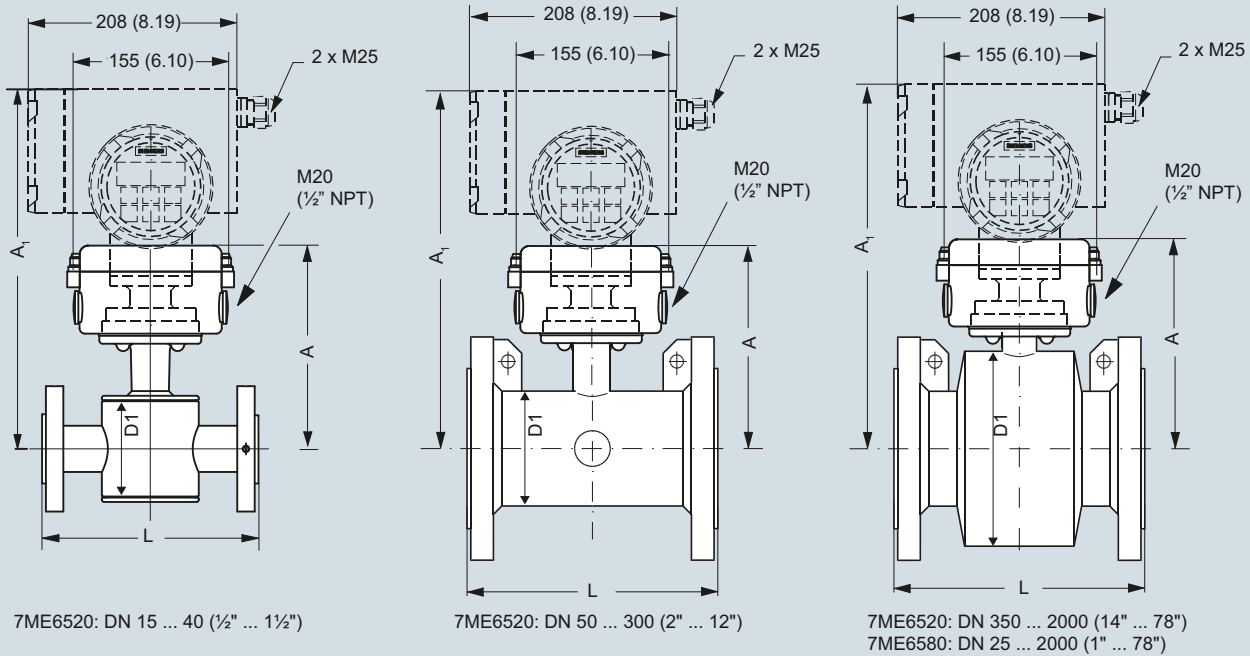
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Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

MAG 5100 W/6000 I Compact



7ME6520 NBR or EPDM liner								7ME6580 Ebonite liner							
Nominal size	A	A1		D1				A	A1		D1		L		
[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	
15	½	177	7.0	331	13.0	77	3.0	187	7.4	-	-	-	-	200	7.9
25	1	187	7.4	341	13.4	96	3.8	187	7.4	341	13.4	104	4.09	200	7.9
40	1½	202	8.0	356	14.0	127	5.0	197	7.8	351	13.8	124	4.88	200	7.9
50	2	188	7.4	342	13.5	76	3.0	205	8.1	359	14.1	139	5.47	200	7.9
65	2½	194	7.6	348	13.7	89	3.5	212	8.3	366	14.4	154	6.06	200	7.9
80	3	200	7.9	354	14.0	102	4.0	222	8.7	376	14.8	174	6.85	200	7.9
100	4	207	8.1	361	14.2	114	4.5	242	9.5	396	15.6	214	8.43	250	9.8
125	5	217	8.5	371	14.6	140	5.5	255	10.0	409	16.1	239	9.41	250	9.8
150	6	232	9.1	386	15.2	168	6.6	276	10.9	430	16.9	282	11.1	300	11.8
200	8	257	10.1	411	16.2	219	8.6	304	12.0	458	18.0	338	13.31	350	13.8
250	10	284	11.2	438	17.2	273	10.8	332	13.1	486	19.1	393	15.47	450	17.7
300	12	310	12.2	464	18.3	324	12.8	357	14.1	511	20.1	444	17.48	500	19.7
350	14	382	15.0	536	21.1	451	17.8	362	14.3	516	20.3	451	17.76	550	21.7
400	16	407	16.0	561	22.1	502	19.8	387	15.2	541	21.3	502	19.76	600	23.6
450	18	438	17.2	592	23.3	563	22.2	418	16.5	572	22.5	563	22.16	600	23.6
500	20	463	18.2	617	24.3	614	24.2	443	17.4	597	23.5	614	24.17	600	23.6
600	24	514	20.2	668	26.3	715	28.2	494	19.4	648	25.5	715	28.15	600	23.6
700	28	564	22.2	718	28.3	816	32.1	544	21.4	698	27.5	816	32.13	700	27.6
750	30	591	23.3	745	29.3	869	34.2	571	22.5	725	28.5	869	34.21	750	29.5
800	32	616	24.3	770	30.3	927	36.5	606	23.9	760	29.9	927	36.5	800	31.5
900	36	663	26.1	817	32.2	1032	40.6	653	25.7	807	31.8	1032	40.63	900	35.4
1000	40	714	28.1	868	34.2	1136	44.7	704	27.7	858	33.8	1136	44.72	1000	39.4
	42	714	28.1	868	34.2	1136	44.7	704	27.7	858	33.8	1136	44.72	1000	39.4
	44	765	30.1	919	36.2	1238	48.7	755	29.7	904	35.6	1238	48.74	1100	43.3
1200	48	820	32.3	974	38.3	1348	53.1	810	31.9	964	38.0	1348	53.07	1200	47.2
1400	54	-	-	-	-	-	-	925	36.4	1079	42.5	1574	61.97	1400	55.1
1500	60	-	-	-	-	-	-	972	38.2	1126	44.3	1672	65.83	1500	59.1
1600	66	-	-	-	-	-	-	1025	40.4	1179	46.4	1774	69.84	1600	63.0
1800	72	-	-	-	-	-	-	1123	44.2	1277	50.3	1974	77.72	1800	70.9
2000	78	-	-	-	-	-	-	1223	48.1	1377	54.2	2174	85.59	2000	78.7

- not available

Weight

Nominal size		7ME6520 NBR or EPDM liner										7ME6580 Ebonite liner	
		PN 10		PN 16		PN 40		Class 150/AWWA		AS		PN 16	
[mm]	[inch]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]
15	½	-	-	-	-	4	9	4	9	4	9	5	11
25	1	-	-	-	-	6	12	5	11	4	9	5	11
40	1½	-	-	-	-	8	18	7	15	7	15	8	17
50	2	-	-	9	20	-	-	8	20	9	20	9	20
65	2½	-	-	10.7	24	-	-	11	24	10.7	24	11	24
80	3	-	-	11.6	26	-	-	13	28	11.6	26	12	26
100	4	-	-	15.2	33	-	-	19	41	15.2	33	16	35
125	5	-	-	20.4	45	-	-	24	52	-	-	19	42
150	6	-	-	26	57	-	-	29	64	26	57	27	60
200	8	48	106	48	106	-	-	56	124	48	106	40	88
250	10	64	141	69	152	-	-	79	174	69	152	60	132
300	12	76	167	86	189	-	-	110	243	86	189	80	176
350	14	104	229	125	274	-	-	139	307	115	254	110	242
400	16	119	263	143	314	-	-	159	351	125	277	125	275
450	18	136	299	173	381	-	-	182	400	141	311	175	385
500	20	163	359	223	491	-	-	225	495	189	418	200	440
600	24	236	519	338	744	-	-	320	704	301	664	287	633
700	28	270	595	314	692	-	-	273	602	320	704	330	728
750	30	-	-	-	-	-	-	329	725	-	-	360	794
800	32	346	763	396	873	-	-	365	804	428	944	450	992
900	36	432	951	474	1043	-	-	495	1089	619	1362	530	1168
1000	40	513	1130	600	1321	-	-	583	1282	636	1399	660	1455
	42	-	-	-	-	-	-	687	1512	-	-	-	-
	44	-	-	-	-	-	-	763	1680	-	-	1140	2513
1200	48	643	1415	885	1948	-	-	861	1896	813	1789	1180	2601
1400	54	1592	3510	-	-	-	-	-	-	-	-	1600	3528
1500	60	-	-	-	-	-	-	-	-	-	-	2460	5423
1600	66	2110	4652	-	-	-	-	-	-	-	-	2525	5566
1800	72	2560	5644	-	-	-	-	-	-	-	-	2930	6460
2000	78	3640	8025	-	-	-	-	-	-	-	-	3665	8080

- not available

With transmitter MAG 5000 and MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lb), with MAG 6000 I, weight is increased by 5.5 kg (12.1 lb).

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Overview



SITRANS F M TRANSMAG 2 with the SITRANS F M 911/E sensor is a pulsed alternating field magnetic flowmeter where the magnetic field strength is much higher than conventional DC pulsed magnetic flowmeters.

Benefits

- Wide range of sizes DN 15 to DN 1000 (½" to 40")
- Broad range of liner and electrode materials for extreme process medias
- Fully welded construction provides a ruggedness that suits the toughest applications and environments.
- Automatic reading of SmartPLUG for easy commissioning
- Simple menu operation with two-line display
- Comprehensive self-diagnostic with selfmonitoring and internal simulation

Application

The main applications of the SITRANS F M transmitter TRANSMAG 2 can be found in the following sectors:

- Pulp and Paper industry
- Mining industry

The patented pulse alternating field technology is ideal for difficult applications like:

- High concentrated paper stock > 3 %
- Heavy mining slurries
- Mining slurries with magnetic particles.
- Low conductive medias $\geq 1 \mu\text{S/cm}$ (0.1 $\mu\text{S/cm}$ depending on medium)

Design

- Available for remote mounting
- PROFIBUS PA (profile 2.0) / HART communication
- Analog output and digital outputs for pulses, device status, limits, flow direction, frequency output

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Function

The TRANSMAG 2 is a microprocessor-based transmitter with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

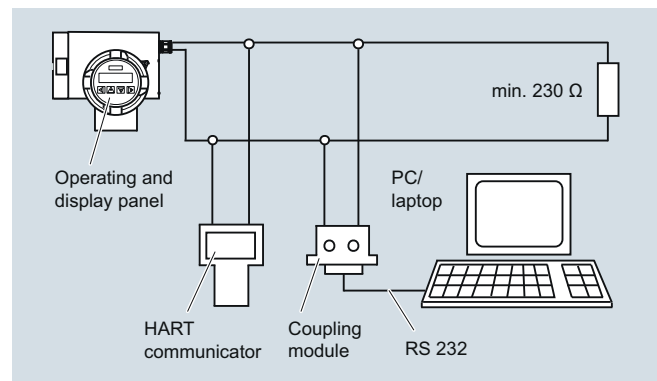
The magnetic flux density in the sensor is additionally monitored by reference coils.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

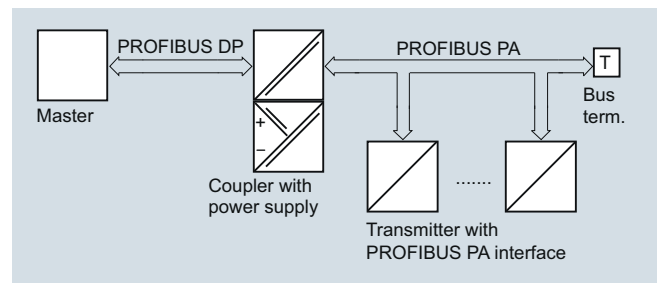
Displays and keypad

Operation of the transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS PA communication



HART communication



PROFIBUS PA communication

Technical specifications

Transmitter TRANSMAG 2

Mode of operation and design

Measuring principle	Electromagnetic with pulsed alternating field (PAC)
Magnetic field excitation	Automatic power supply synchronization
- 50 Hz AC power supply	Bipolar (16.7 Hz) Bipolar with prepulse (10 Hz) Unipolar (8.33 Hz)
- 60 Hz AC power supply	Bipolar (20 Hz) Bipolar with prepulse (12 Hz) Unipolar (10 Hz)

Accuracy under reference conditions

Measuring tolerance of pulse output	
• With $v > 0.25$ m/s (0.82 ft/s)	$\leq \pm 0.5$ % of measured value ± 1.2 mm/s (0.05 inch/s)
• With $v < 0.25$ m/s (0.82 ft/s)	± 2.5 mm/s (0.1 inch/s)
Measuring tolerance of analog output	As pulse output plus ± 0.1 % conversion error ± 20 μ A
Repeatability	0.2 % of measured value

Reference conditions

• Process temperature	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Ambient temperature	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Warm-up time	Min. 30 min
• Installation conditions	Inlet pipe section $\geq 10 \times$ DN Outlet pipe section $\geq 5 \times$ DN Installed centered in pipe
• Medium	Water without gaseous or solid components

Calibration

Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %
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Output

Electrical isolation	Outputs electrically isolated from one another and from the power supply, max. 60 V permissible against PE/equipotential bonding
----------------------	--

Current output

	0/4 ... 20 mA (7ME5034-0.... or 7ME5034-2....)
• Signal	
- Upper limit	0/4 ... 20 mA, selectable
- Failure	20 ... 22.5 mA, optional 3.6; 20 or 24 mA
• Load	
- Output	max. 600 Ω , max. load voltage 15 V DC
- For HART communication	≥ 250 Ω

Communication

	Via analog output with PC coupling module or HART communicator
• Protocol	HART, version 5.1

Digital output

Signal	
• Output	Configurable as active or passive signals
- Active signal	24 V DC, ≤ 24 mA, $R_i = 170$ Ω
- Passive signal	Open collector, max. 30 V DC, 200 mA

Output configuration

• Pulse	
- Pulse significance	≤ 5000 pulses/s
- Pulse width	≥ 0.1 ms
• Limit frequency	≤ 10000 Hz
• Limits	Limits for flow and quantity, flow direction, alarm

Digital output 2 (relay)
(only 7ME5034-0....)

Relay	NC or NO function
• Rating	Max. 5 W, max. 50 V AC/DC, max. 200 mA
• Output configuration	Limits for flow and quantity, flow direction, alarm

Digital input (optional to digital output 2)

(only 7ME5034-2....)	
• Input function configurable as high-active or low-active	Set measured value or counter to zero
• Signal voltage	Max. 30 V DC, $R_i = 3$ k Ω : High level: +11 ... +30 V DC Low level: -30 ... +5 V DC

For PROFIBUS devices

PROFIBUS PA (for PROFIBUS-devices 7ME5034-1....)	
• Communication	Layer 1 and 2 according to PROFIBUS PA Transmission according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS PA and DP V1 (EN 50170) Device class B, device profile 2.0 Max. 4 simultaneous C2 connections
• Bus voltage	9 ... 32 V DC permissible
• Current consumption from bus	10 mA; limited to ≤ 15 mA in event of fault by electrical current limitation

Rated operating conditions

Installation conditions	See also sensor
Ambient temperature	
• Operation	-20 ... +60 °C (-4 ... +140 °F)
• Display module	0 ... 50 °C (32 ... 122 °F)
Storage	-25 ... +80 °C (-13 ... +176 °F)
Degree of protection	IP67/NEMA 4X
Electromagnetic compatibility (EMC)	
• Emitted interference	To IEC/EN 61326 for use in industrial areas
• Noise immunity	To IEC/EN 61326 for use in industrial areas

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Medium conditions	
• Process temperature	-20 ... +150 °C (-4 ... 302 °F) depending on the liner
Minimum conductivity of medium	
• With SITRANS F M 911/E sensors	≥ 1 μS/cm (0.1 μS/cm depending on medium)
Design	
Weight of transmitter	4.4 kg (9.7 lb)
Remote version	Transmitter must be connected to sensor using shielded cable
Maximum cable length	100 m (328 ft)
Housing	Die-cast aluminum, painted
Displays and keypad	
General display	LCD, backlid, two lines with 16 characters each
Multi-display for	Flow, totalizer, flow velocity
Keypad	4 keys for entering parameters
Power supply	
corresponding to rating plate	
• AC supply	100 ... 250 V AC ± 15 %, 47 ... 63 Hz
• Power consumption	Approx. 120 ... 630 VA, depend- ing on sensor
Line fuse	100 ... 230 V AC: T1.6A
Magnet current fuse	F5A/250 V

Sensor cables between sensor and transmitter

The signal voltage proportional to the flow and present at the electrodes of the EMF is only a few μV to mV. Superimposed on this are electrochemical interferences resulting from the contact between the electrodes and liquid, and which can be up to several Volt. Also frequently superimposed are line frequency interferences, interferences resulting from vibrations on the pipelines or signal cables, as well as strong magnetic fields in the vicinity. Sufficient shielding must therefore be provided, as well as fixed routing of the signal cables (electrode and magnet current cable) in the case of remote versions. This also applies to devices with integral preamplifier (smartPLUG). The cable length between the sensor and transmitter must not exceed 100 m (328 ft).

Attention must also be paid to the cable routing. Signal cables must be routed free of vibration, and protected against strong magnetic and stray fields. In case of doubt, the sensor cables must be routed in earthed steel conduit.

Selection and Ordering data	Article No.
SITRANS F M electromagnetic transmitter TRANSMAG 2 for alternating field, remote version, 110 ... 230 V AC	7ME5034 - AA 1 - AA0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Output/communication	
4 ... 20 mA with HART protocol	0
PROFIBUS PA connection	1
4 ... 20 mA with HART protocol, digital input	2
Operator display and keypad	
Without	0
With	1
Cable glands	
M20/M16 x 1.5	1
½" NPT	2

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Strengthened mounting bracket for wall and pipeline installation	A02
Measuring range, specify in plain text: Y01: 0 to ... m ³ /h	Y01
Pulse significance, specify in plain text: Y02: 0 to ... pulses/l	Y02
Setting of digital outputs, specify in plain text: Y03: Setting of digital outputs: ...	Y03
Measuring-point number (max. 8 characters), specify in plain text: Y15:	Y15
Measuring-point description (max. 16 characters), specify in plain text: Y16:	Y16
Stainless steel tag plate	Y17
Other post-production requirements (add plain text)	Y99




Operating instructions for SITRANS F M TRANSMAG 2

Description	Article No.
• English	A5E00102775
• German	A5E00192774
• Spanish	A5E00135276
• French	A5E00135275

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.









All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.	
Standard wall mounting bracket. Steel AISI 316L/ EN10088-2-1.4404	7ME5933-0AC04	
Special wall-/pipe mounting bracket kit. BI 2.5 DIN 59382 X6Cr17	7ME5933-0AC05	
Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220	

- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Spare parts

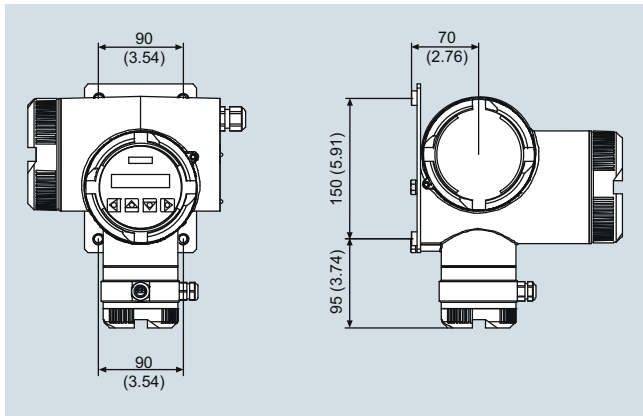
Description	Article No.	
Operating/Display module	7ME5933-0AC00	
Electronics cover with glass plate (non Ex). Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC01	
Cover for sensor cable and gasket. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC02	
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC03	
Safety clamp for electronic cover with glass plate (7ME5933-0AC01)	7ME5933-0AC06	
M20 cable gland set for power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	A5E02246350	
1/2" NPT cable gland set for power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	A5E02246396	
M16 x 1.5 cable gland set for sensor connection, brass chrome, 2 pcs. and 2 pcs. blind • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +105 °C (-4 ... +221 °F)	A5E02246369	

Flow Measurement

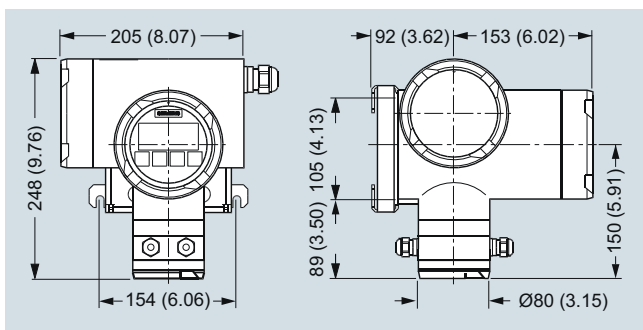
SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Dimensional drawings

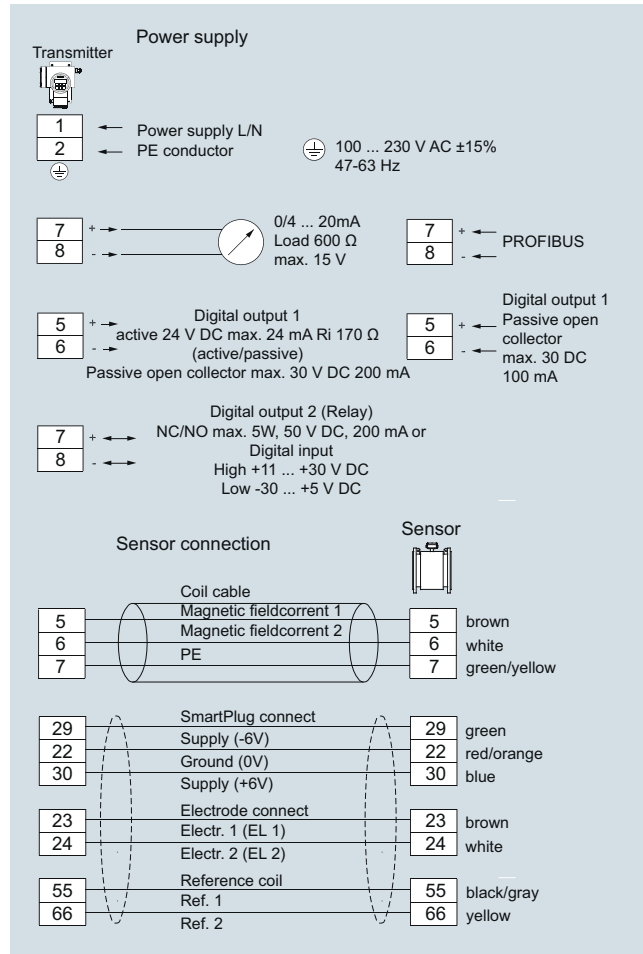


SITRANS F M transmitter TRANSMAG 2 with wall mounting bracket, dimensions in mm (inch)



SITRANS F M transmitter TRANSMAG 2 with wall and pipeline mounting bracket, dimensions in mm (inch)

Schematics

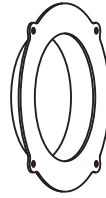


SITRANS F M transmitter TRANSMAG 2, connection diagram

Transmitter TRANSMAG 2 with sensor 911/E

911/E sensor	
Process connection	
Nominal diameters	DN 15 ... 1000 (½" ... 40")
Metering tube connections	EN 1092-1, ANSI B16.5, AWWA C-207 and JIS 10 K
Rated operating conditions	
<u>Installation conditions</u>	
See system information	
• Soft rubber liner	0 ... 70 °C (32 ... 158 °F)
• Hard rubber liner	0 ... 90 °C (32 ... 194 °F) Option: 100 °C (212 °F)
• PTFE liner	<ul style="list-style-type: none"> • -20 ... +150 °C (-4 ... +302 °F) at 25 bar (363 psi) • -20 ... +100 °C (-4 ... +212 °F) at 40 bar (580 psi)
• Linatex (rubber) liner	-40 ... +70 °C (-40 ... +158 °F) (for temperatures below -20 °C (-4 °F) AISI 316L/1.4404 flanges must be used)
• Novolak liner	130 °C (266 °F) at 40 bar (580 psi)
Degree of protection	IP67/NEMA 4X Optional IP68/NEMA 6
<u>Medium conditions</u>	
Maximum flow velocity	12 m/s (39.4 ft/s)
Full scale value of flow velocity	0.15 ... 12 m/s (0.49 ... 39.4 ft/s)
Design	
Weight	See dimensional drawings
Flange and housing material	Mild steel (1.0460/1.0570, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316L/1.4404 flanges and carbon steel housing, with corrosion-resistant two-component epoxy coating (min. 150 µm)
Measuring pipe material	Stainless steel AISI 304 or higher
Electrode material	<ul style="list-style-type: none"> • AISI 316Ti/1.4571 • PTFE: Hastelloy C276/2.4819 • Platinum • Titanium • Tantalum
Grounding electrode material	Defined via the Order code

Protection rings for liners



Function	To protect the edges of liners from abrasion (e.g. gravel, sand etc.). Used mainly with soft rubber liners and for PTFE liners at high temperatures from 100 to 150 °C (212 to 302 °F).
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel AISI 316Ti/1.4571, optionally Hastelloy C276/2.4819
Material thickness	The overall length of the sensor is increased by <ul style="list-style-type: none"> • 6 mm for DN 15 to DN 150 (0.24" for ½" to 6") or • 10 mm for DN 200 to DN 600 (0.4" for 8" to 24")
Standard	Optional for all liners. Must be ordered separately.
Article No.	7ME5912-....

Earthing washers



Function	Electrical reference and earthing of the medium. Required if the pipelines are not electrically conducting or are lined (plastic pipelines, concrete pipelines etc.). All earthing rings must be connected to the earthing screw present on the sensor.
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610
Material thickness	The overall length of the sensor is increased by 2 mm (0.08") per earthing ring.
Standard	Optional for all liners. Required between the medium and sensor for equipotential bonding between non-conducting pipelines or lined pipelines.
Article No.	7ME5902-....

Important:

The rings must be ordered together with the sensor. In case of replacement please include the sensor MLFB code on the order.

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Notes on pressure equipment directive

The devices are designed for liquids of danger group "Gases of fluid group 1". The categories differ according to the version, and are listed in the table below.


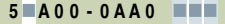
The minimum temperature is defined at -10 °C (14 °F) for the flange materials C22.8 (1.0460).

The minimum temperature is defined at -20 °C (-4 °F) for the flange material 1.4404/316L. For further information on the PED standard and requirements, see page 9/6.

Classification according to pressure equipment directive (PED 97/23/EC)

Nominal diameter		Nominal pressure		Permissible media	Category
DN	(inch)	PN	(MWP psi)		
15 ... 25	(½" ... 1")	40	(580)	Gases fluid group 1 and liquids fluid group 1	Article 3.3
200 ... 300	(8" ... 12")	10	(145)	Gases fluid group 1 and liquids fluid group 1	II
65 ... 250	(2½" ... 10")	16	(232)	Gases fluid group 1 and liquids fluid group 1	II
40 ... 100	(1½" ... 4")	40	(580)	Gases fluid group 1 and liquids fluid group 1	II
350 ... 1000	(14" ... 40")	10	(145)	Gases fluid group 1 and liquids fluid group 1	III
300 ... 1000	(12" ... 40")	16	(232)	Gases fluid group 1 and liquids fluid group 1	III
200 ... 600	(8" ... 24")	25	(363)	Gases fluid group 1 and liquids fluid group 1	III
125 ... 600	(5" ... 24")	40	(580)	Gases fluid group 1 and liquids fluid group 1	III

Transmitter TRANSMAG 2 with sensor 911/E

Selection and Ordering data	Article No.	Selection and Ordering data	Order Code
Flowsensor SITRANS F M 911/E	7ME5610 -	Additional information	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Nominal diameter		Two earthing (grounding) electrodes made of stainless steel AISI 316Ti/1.4571	A02
DN 15 (1/2")	1 V	Two earthing (grounding) electrodes made of Hastelloy C276/2.4819	A04
DN 25 (1")	2 D	Two earthing (grounding) electrodes made of Platinum	A05
DN 40 (1 1/2")	2 R	Two earthing (grounding) electrodes made of Titanium	A06
DN 50 (2")	2 Y	Two earthing (grounding) electrodes made of Tantalum	A07
DN 65 (2 1/2")	3 F	Factory certificate to EN 10204-2.2	C14
DN 80 (3")	3 M	Acceptance test B to DIN 50049, section 3.1 and EN 10204	C16
DN 100 (4")	3 T	Tag name plate, stainless steel, add plain text	Y17
DN 125 (5")	4 B	Other postproduction requirements, add plain text	Y99
DN 150 (6")	4 H		
DN 200 (8")	4 P	1) 20 °C (68 °F), max. 19.6 bar (285 psi) for steel flanges and max. 15.9 bar (231 psi) for stainless steel flanges	
DN 250 (10")	4 V	2) 20 °C (68 °F), max. 51.1 bar (741 psi) for steel flanges and max. 41.4 bar (600 psi) for stainless steel flanges	
DN 300 (12")	5 D		
DN 350 (14")	5 K		
DN 400 (16")	5 R		
DN 450 (18")	5 Y		
DN 500 (20")	6 F		
DN 600 (24")	6 P		
DN 700 (28")	6 Y		
DN 750 (30")	7 D		
DN 800 (32")	7 H		
DN 900 (36")	7 M		
DN 1000 (40")	7 R		
Flange norm and pressure rating			
EN 1092-1, PN 10 (DN 200 ... 1000 (8" ... 40"))	B		
EN 1092-1, PN 16 (DN 65 ... 1000 (2 1/2" ... 40"))	C		
EN 1092-1, PN 25 (DN 200 ... 1000 (8" ... 40"))	E		
EN 1092-1, PN 40 (DN 15 ... 1000 (1/2" ... 40"))	F		
ANSI B16.5, Class 150 (1/2" ... 24") ¹⁾	J		
ANSI B16.5, Class 300 (1/2" ... 24") ²⁾	K		
AWWA C-207 Class D (28" ... 40")	L		
JIS 10 K (1/2" ... 24")	R		
Flange material			
Mid steel flanges 1.0460/1.0570	1		
Stainless steel flanges, AISI 316L/1.4404	3		
Liner material			
Soft rubber (from DN 25)	1		
PTFE (without protection washers)	3		
Hardrubber	4		
Linatex (from DN 40)	5		
Novolak (sealing material FFKM) (from DN 50)	6		
Electrode material			
AISI 316Ti/1.4571	1		
Hastelloy C276/2.4819	2		
Platinum	3		
Titanium	4		
Tantalum	5		
Cable glands/terminal box			
Metric: Polyamide terminal box	1		
1/2" NPT: Polyamide terminal box	2		
		Selection and Ordering data	Article No. Order code
		SITRANS F M TRANSMAG 2 and sensor 911/E	7ME5930 -
		Cable	5 A00 - 0AA0
		Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
		Cable kit for sensor 911/E with alternating field, Magnet current cable 3 x 1.0 mm ² (3 x 0.0016 inch ²), electrode/reference cable 7 x 0.5 mm ² (7 x 0.0008 inch ²) with shield PVC	
		<ul style="list-style-type: none"> Length: 5 m (16.4 ft) Length: 10 m (32.8 ft) Length: 20 m (65.6 ft) Length: 30 m (98.4 ft) Specify other length: in plain text 	B C D E Z
			J 1 Y

Flow Measurement

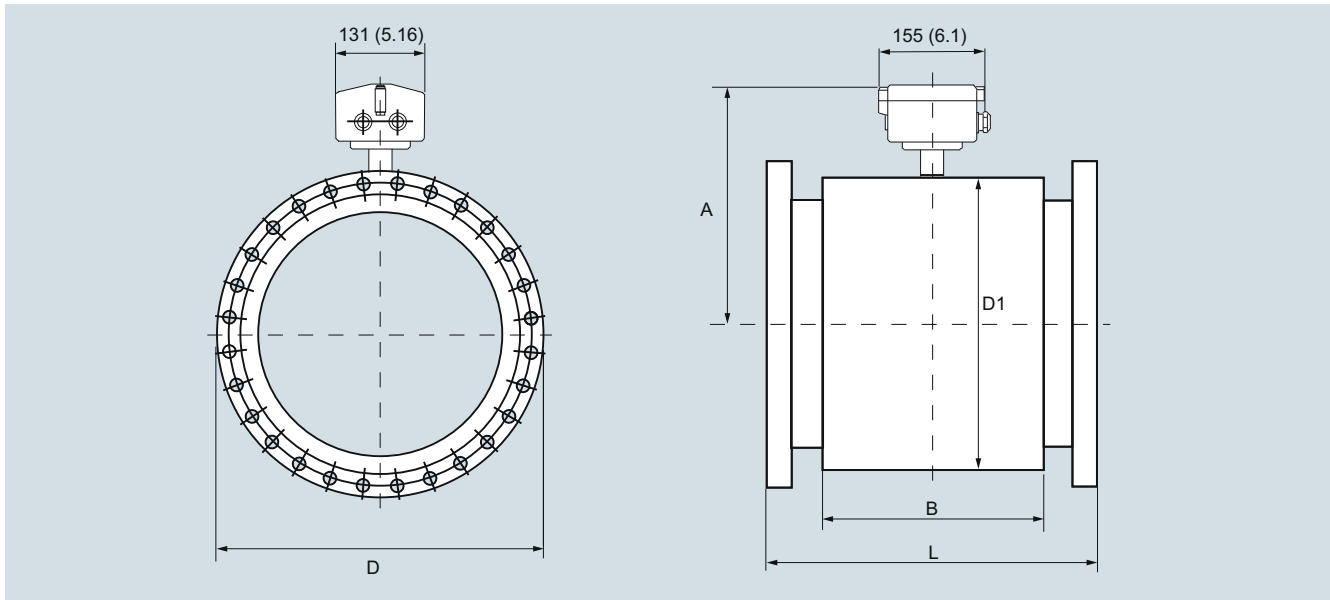
SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Selection and Ordering data	Article No.	Order code
SITRANS F M electromagnetic flowmeter		
Protection rings for flow sensor 911E (per pair)	7ME5912 -	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Liner		
Hard rubber/soft rubber/Linatex		1
Novolak		7
PTFE		0
Nominal diameter		
<i>for PTFE, mat. no. 1.4571/316 Ti</i>		
DN 15 (1/2")		AA
DN 25 (1")		CA
DN 40 (1 1/2")		EA
DN 50 (2")		FA
DN 65 (2 1/2")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
Other nominal diameters: specify in plain text		ZA J 1 Y
<i>for Hard/Soft rubber, Novolak, mat. no. 1.471/316 Ti</i>		
DN 15 (1/2")		AB
DN 25 (1")		CB
DN 40 (1 1/2")		EB
DN 50 (2")		FB
DN 65 (2 1/2")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
Other nominal diameters: specify in plain text		ZB J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data	Article No.	Order code
SITRANS F M electromagnetic flowmeter		
Earthing rings for flow sensor 911E (per unit)	7ME5902 -	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Liner		
Hard rubber/soft rubber		1
Novolak		7
PTFE		0
Nominal diameter		
<i>Mat. no. 1.4571/316 Ti</i>		
DN 15 (1/2")		AA
DN 25 (1")		CA
DN 40 (1 1/2")		EA
DN 50 (2")		FA
DN 65 (2 1/2")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
DN 350 (14")		QA
DN 400 (16")		RA
DN 500 (20")		SA
DN 600 (24")		TA
DN 700 (28")		UA
DN 800 (32")		VA
DN 900 (36")		WA
DN 1000 (40")		XA
Other nominal diam.: specify in plain text		ZA J 1 Y
<i>Material Hastelloy C4/2.4610</i>		
DN 15 (1/2")		AB
DN 25 (1")		CB
DN 40 (1 1/2")		EB
DN 50 (2")		FB
DN 65 (2 1/2")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
DN 350 (14")		QB
DN 400 (16")		RB
DN 500 (20")		SB
DN 600 (24")		TB
Other nominal diam.: specify in plain text		ZB J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Dimensional drawings



SITRANS F M flow sensor 911/E, remote version, dimensions in mm (inch)

Build-in length 911/E [in mm and inch]

Nominal diameter	DN 15 ½"	DN 25 1"	DN 40 1 ½"	DN 50 2"	DN 65 2 ½"	DN 80 3"	DN 100 4"	DN 125 5"	DN 150 6"	DN 200 8"	DN 250 10"											
Build-in length L¹⁾																						
Hard rubber version	270 (10.63)		280 (11.02)		330 (12.99)		340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)										
Linatex/soft rubber version	270 (10.63)		280 (11.02)		330 (12.99)		340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)										
PTFE-liner without protection rings	270 (10.63)		280 (11.02)		330 (12.99)		340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)										
Novolak-version	-		275 (10.83)		325 (12.79)		335 (13.19) 333 (13.11)		362 (14.25)		401 (15.79)	460 (18.11)										
Dimensions of sensor housing																						
Housing width B	170 (6.69)									240 (9.45)												
Height A	206 (8.11)		222 (8.74) 229 (9.02)		262 (10.32)		274 (10.79) 286 (11.26)		299 (11.78)		334 (13.15) 358 (14.10)											
Housing diameter D ₁	135 (5.35)		167 (6.58) 182 (7.17)		247 (9.73)		272 (10.71) 296 (11.65)		322 (12.68)		392 (15.43) 440 (17.32)											
Weight of PN16 version in kg (MWP 232 psi version in lb) approx.	8.0 (17.64)	8.5 (18.74)	11.5 (25.35)	25.0 (55.12)	26 (57.32)	27 (59.53)	28 (61.73)	34 (74.95)	38 (83.78)	68 (149.9)	81 (178.6)											
Nominal diameter	DN 300 12"	DN 350 14"	DN 400 16"	DN 450 18"	DN 500 20"	DN 600 24"	DN 700 28"	DN 750 30"	DN 800 32"	DN 900 36"	DN 1000 40"											
Build-in length L¹⁾																						
Hard rubber version	500 (19.68)		550 (21.65)		600 (23.62)		650 (25.59) 780 (30.71)		910 (35.83)		1040 (40.95)	1170 (46.06)	1300 (51.18)									
Linatex/soft rubber version	500 (19.68)		550 (21.65)		600 (23.62)		660 (25.98) 650 (25.59) 780 (30.71)		-		-											
PTFE-liner without protection rings	500 (19.68)		550 (21.65)		600 (23.62)		660 (25.98) 650 (25.59) 780 (30.71)		-		-											
Novolak-version	489 (19.25)		538 (21.18)		592 (23.31)		638 (25.12) 638 (25.12) 772 (30.39)		903 (35.55)		1033 (40.63)	1163 (45.79)	1293 (50.91)									
Dimensions of sensor housing																						
Housing width B	240 (9.45)		225 (8.86)		250 (9.84)		270 (10.63)		300 (11.81)		360 (14.17)		420 (16.54)		500 (19.69)		560 (22.05)		620 (24.41)			
Height A	383 (15.08)		375 (14.76)		400 (15.75)		433 (17.05)		453 (17.84)		505 (19.88)		558 (21.97)		590 (23.23)		608 (23.94)		658 (25.91)		713 (28.07)	
Housing diameter D ₁	490 (19.29)		474 (18.66)		524 (20.63)		591 (23.26)		629 (24.76)		734 (28.90)		839 (33.03)		904 (35.59)		939 (36.97)		1039 (40.91)		1150 (45.28)	
Weight of PN10 Version in kg (MWP 145 psi version in lb) approx.	95 (209.4)		118 (260.2)		161 (354.9)		185 (407.9)		233 (513.7)		401 (884.1)		420 (925.9)		450 (992.1)		500 (1102.3)		560 (1234.6)		620 (1366.9)	

¹⁾ Tolerance for build-in length: L + 0.0/-4.0 mm (+0.00/-0.157 inch)
With protection rings for > DN25 + 6.0 mm, > DN200 + 10.0 mm (> 1" + 0.236 inch, > 8" + 0.394 inch)

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Overview



MAG 8000 is a comprehensive meter which intelligent information and high performance measurement as well as the easy to install concept take cost of ownership and customer service to a new level for water meter.

Benefits

Easy to install

- Compact or remote solution with factory mounted cable and customer setting from factory
- IP68/NEMA 6P enclosure. Sensor can be buried
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities
- Superior measurement
- Down to 0.2 % maximum uncertainty
- OIML R 49 type approval
- PTB K7.2
- FM Fire Service Approval
- Bi-directional measurement

Long lasting performance/Low cost of Ownership

- Verification according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001
- No moving parts means less wear and tear
- Up to 6 to 10 years maintenance-free operation in typical revenue application
- Robust construction built for the application

Intelligent information, easy to access

- Advanced information on site
- Data logger
- Advanced statistics and diagnostics
- Add-on communication modules

Application

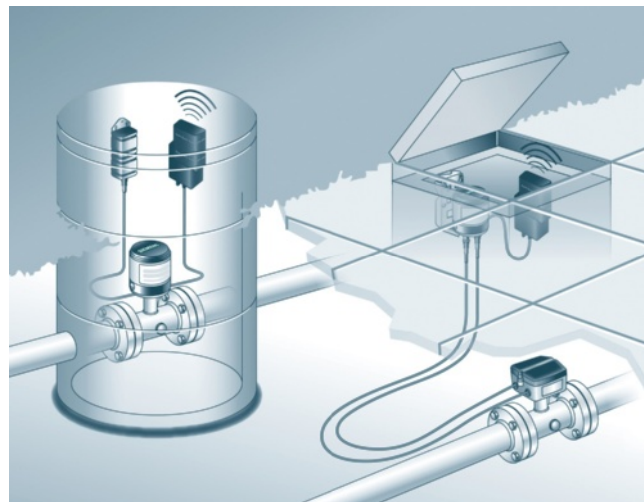
The following MAG 8000 versions are available as stand-alone water meters:

- MAG 8000 (7ME6810) for abstraction and distribution network
- MAG 8000 CT (7ME6820) for revenue and bulk metering
- MAG 8000 (7ME6880) for irrigation

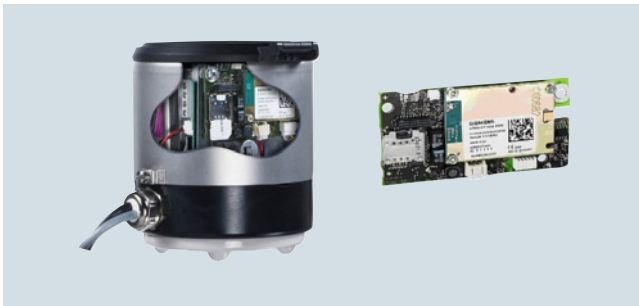
Design

MAG 8000 is designed to minimize power consumption. The product program consists of

- Basic and advanced version
- Sensor sizes from DN 25 to 1200 (1" to 48")
- Compact and remote installation in IP68/NEMA 6P enclosure and factory-mounted cable
- SIMATIC PDM and Flow Tool PC configuration softwares



Modbus/Encoder module



GSM/GPRS communication module



PC-IrDA connection

MAG 8000 GSM/GPRS Wireless Communication Module

The MAG 8000 GSM/GPRS wireless communication module provides the latest mobile technology using a Quad Band (850/900/1800/1900 MHz) module.

The GSM/GPRS module logs data from the MAG 8000 memory and from the two analog inputs (one 4 to 20 mA not powered by the module and one 5 V ratiometric powered by the module) and storage in the internal memory and later transmit it into a system or PC via email or SMS.

An additional synchronization function secures the initial collection time of the data independent of the sample rate used (minimum collection time: 1 per minute).

The package of information retrieved via the csv file includes:

- Time stamp
- Flow rate
- Tot 1
- Tot 2
- Tot 3
- Analog 1 (mA)
- Analog 2 (V)
- Battery lifetime
- Alarm list (as decimal format)

The GPRS technology makes it possible to send a higher amount of data via email. The data is secured using a POP 3 server configuration avoiding encryptions that require additional software. The configuration of the module is performed via SMS commands that allow you to define the users, email accounts, transmission settings, collection, etc.

The GSM/GPRS module is a compact built-in solution which can be installed in the existing MAG 8000 with SW version 3.02 and higher.

The battery lifetime will depend on signal strength and especially on the number of transmissions. Therefore we recommend an optimal setting of transmission once a day (see page 3/119). The module also includes the same power management algorithm that secures a very good calculation of the remaining battery lifetime.

The OPC server specifically designed for the MAG 8000 GSM/GPRS module is offered free of charge. With this value-added package, the opportunity for measurement data collection and further processing/analyzing for system integration and automation is offered.

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Function

MAG 8000 is a microprocessor-based water meter with graphical display and key for optimum customer operation and information on site. The transmitter drives the magnetic field in the sensor, evaluates the flow signal from the sensor and calculates the volume passing through. It delivers the required information via the integrated pulse output or communication interfaces as part of a system solution. Its intelligent functionality, information and diagnostics ensure optimum meter performance and information to optimize water supply and billing.



MAG 8000 can be ordered as a Basic or an Advanced version.

Features / Version	MAG 8000 Basic/ MAG 8000 Irrigation	MAG 8000 Advanced
Measuring frequency in battery power mode (Manually selected) ¹⁾	1/15, 1/30 or 1/60 Hz	from 6.25 to 1/60 Hz depending of sensor size
Output MAG 8000	2 FW/RV/AI/CA (max. 50 Hz pulse rate)	2 FW/RV/AI/CA (max. 100 Hz pulse rate)
Communication	Add-on	Add-on
Data logger	Yes	Yes
Insulation test	No	Yes
Leakage detection	No	Yes
Meter utilization	No	Yes
Statistics	No	Yes
Tariff	No	Yes
Settle date (Revenue)	No	Yes

¹⁾ Excitation frequency settings with mains power supply, see technical specifications for each version

Some information is accessible via the display whereas all information is accessible via the IrDA communication interface with the PDM software. Data and parameters are registered in a EEPROM. They can all be read, but changing the information demands a software password or a hardware key attached to the printed circuit board.

The SIMATIC PDM tool gives the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with all specific data that define the quality status of the measurement.

The Qualification Certificate consists of two pages with information about the actual status of the sensor:

Part 1 provides general settings, sensor and battery info, totalizer values and pulse output settings.

Part 2 provides detailed information about electronic and sensor functionality and a main parameter list for evaluating the functionality of the MAG 8000 water meter.



SIMATIC PDM

Details about the SIMATIC PDM tool can be found in chapter "Communication and Software" (see page 8/11).

Technical specifications

Transmitter	
Installation	Compact (integral) Remote with factory-mounted cable 5, 10, 20 or 30 m (16.4, 32.8, 65.6 or 98.4 ft)
Enclosure	Stainl. steel top housing (AISI 316) and coated brass bottom. Remote wall mount bracket in stainless steel (AISI 304).
Cable entries	2 x M20 (one gland for one cable of size 6 ... 8 mm (0.02 ... 0.026 ft) is included in the standard delivery)
Display	Display with 8 digits for main information. Index, menu and status symbols for dedicated information
Resolution	Totalized information can be displayed with 1, 2 or 3 decimals or automatic adjustment (default)
Flow unit	
Europe	Volume in m ³ and flow rate in m ³ /h
US	Volume in Gallon and flow rate in GPM
Australia	Volume in MI and flow rate as MI/d
Optional display units	Volume: m ³ x 100, l x 100, G x 100, G x 1000, MG, CF x 100, CF x 1000, AF, Al, kl, BBL42 Flow: m ³ /min, m ³ /d, l/s, l/min, GPS, GPH, GPD, MGD, CFS, CFM, CFH, BBL42/s, BBL42/min, BBL42/h, BBL42/d
Digital output	2 passive outputs (MOS), individual galvanically isolated Maximum load ± 35 V DC, 50 mA short circuit protected
Output A function	Programmable as pulse volume – forward – reverse – forward/net – reverse/net
Output B function	Programmable as pulse volume (like output A), alarm
Output	Max. pulse rate of 50 Hz (only Basic version) and 100 Hz (only Advanced version), pulse width of 5, 10, 50, 100, 500 ms
Communication	IrDA: Standard integrated infrared communication interface with Modbus RTU protocol
Add-on modules	<ul style="list-style-type: none"> • RS 232 serial interface with Modbus RTU (Rx/Tx/GND), point to point with max. 15 m cable • RS 485 serial interface with Modbus RTU (+/-/GND), multidrop with up to 32 devices with max. 1000 m cable • Encoder interface module (for Itron 200WP) "Sensus protocol" • GSM/GPRS module with or without analog input cable
Power supply	Auto detection of power source with display symbol for operation power.
Internal battery pack	1 D-Cell 3.6 V/16.5 Ah
External battery pack	2 D-Cell 3.6 V/33 Ah 4 D-Cell 3.6 V/66 Ah

Mains power supply

- 12 ... 24 V AC/DC (10 ... 32 V) 2 VA
- 115 ... 230 V AC (85 ... 264 V) 2 VA

Both mains power supply systems are upgradable for battery backup via internal D-Cell (3.6 V 16.5 Ah) or external battery pack.

Cable

3 m (9.8 ft) for external connection to mains supply (without cable plug)

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Features	
Application identification	Tag number up to 15 characters
Time and date	Real time clock
Totalizer	
MAG 8000	3 totalizer: Configurable to Forward, Reverse and Bidirectional netflow 1 totalizer (following totalizer 1 setting) resettable via display key
Measurement	
Low flow cut-off	0.05 % of Q3 free adjustable
Empty pipe detection	Symbolised in display
Data logger	Logging of 26 records: selectable as daily, weekly or monthly logging
Alarm	Active alarm is indicated on the display
Data protection	All data stored in an EEPROM. Totalizers 1 and 2 are backed up every 10 min, statistic every hour and power consumption and temperature measurement every 4 hour. Password protection of all parameters and hardware protection of calibration and revenue parameters.
Battery power management	Optimal battery information on remaining capacity. Calculated capacity includes all consuming elements and available battery capacity is adjusted related to change in ambient temperature. Numbers of power-ups Date and time registered for first and last time power alarm.
Diagnostic	
Continuous self test including	Coil current to drive the magnetic field Signal input circuit Data calculation, handling and storing
Alarm statistics and logging for fault analyzing	Electrode impedance to check actual media contact Flow simulation to check pulse and communication signal chain for correct scaling Number of sensor measurements (excitations) Transmitter temperature (battery capacity calculation) Low impedance alarm for change in media Flow alarm when defined high flow exceeds Verification mode for fast measure performance check
Insulation test (only Advanced version)	Test of signal immunity against disturbance and bad installation. Test interval is selectable and measurement is interrupted during the test period of 4 min.
Leakage detection (only Advanced version)	Monitoring the lowest flow or volume during selected time window within 24 hours. Leakage is detected over a selectable period where monitored value exceed the possible leakage level. Min and max values are stored with date registration. Last store value visible on the display.
Meter Utilization (only Advanced version)	6 registers for monitoring total time the meter has operated in different flow intervals. Registered intervals are free selectable as % of Q_n (Q3)
Tariff (only Advanced version)	6 tariff registers count the volume delivered within the selected tariff windows, based on time of day or flow rates or a combination. Tariff can also be used for consumption profile where consumption is related to different time intervals or flow rates. Tariff values visible on the display.
Settling date (only Advanced version)	On a predefined date the totalizer 1 index value is stored. Old values are stored to show the latest two totalized 1 index values. Settling values visible on the display.
Statistic (only Advanced version)	Min. flow rate with time and date registration Max. flow rate with time and date registration Min. daily consumption with date registration Max. daily consumption with date registration Latest 7 days total and daily consumption Actual month consumption Latest month consumption
PC Configuration Software PDM	<ul style="list-style-type: none"> • Meter configuration – online and offline mode • Own parameter settings • Parameter documentation • Print and export of data and parameters PDM 6.0 Service Pack 2 – Basic and Online version

MAG 8000 water meter uncertainty

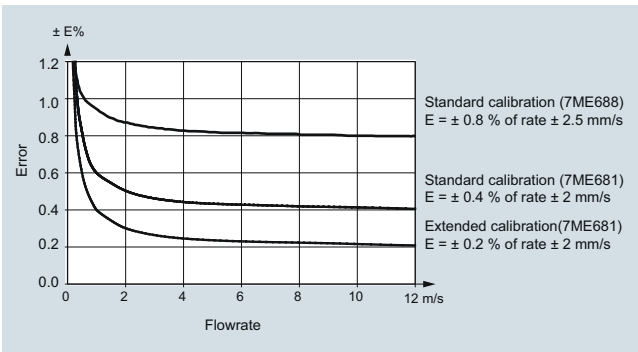
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h.

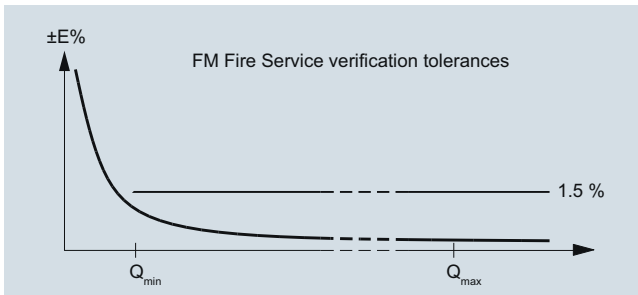
Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

The selected calibration determines the accuracy of the meter. A standard calibration results in max. ± 0.4 % uncertainty and an extended calibration ± 0.2 % (for MAG 8000 irrigation ± 0.8 %). A calibration certificate follows every sensor and calibration data are stored in the meter unit.



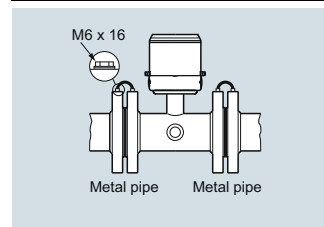
MAG 8000 (7ME6810) for Fire Service applications

MAG 8000 (7ME6810) is FM Fire Service approved for automatic fire protection systems according to the Fire Service Meters Standard, Class Number 1044. The approval is applicable for the sizes DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges. The FM Fire Service approved product can be ordered via the Z-options P20, P21 and P22



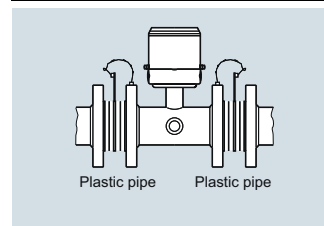
Grounding

The sensor body must be grounded using grounding straps and/or grounding rings to protect the flow signal against stray electrical noise. This ensures that the noise is carried through the sensor body and a noise-free measuring area within the sensor body. For MAG 8000 Irrigation grounding rings on both sides are factory-mounted.



Metal pipes

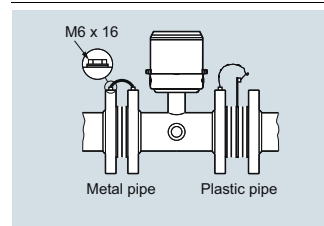
On metal pipes, connect the straps to both flanges.



Plastic pipes

On plastic pipes and lined metal pipes, optional grounding rings must be used at both ends.

Grounding rings has to be ordered separately see „Grounding ring kit“



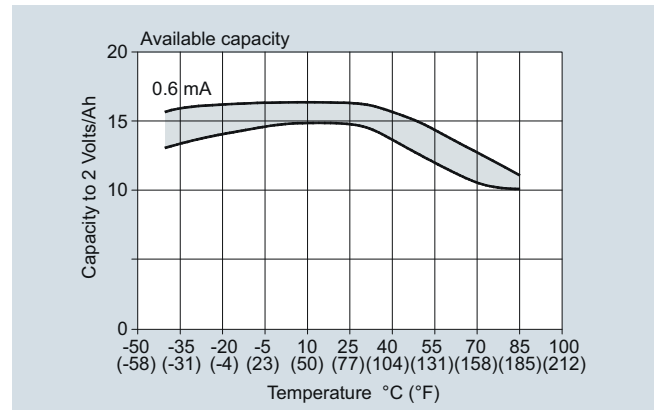
Combination of metal and plastic pipes

A combination of metal and plastic requires straps for metal pipe and grounding rings for plastic pipe.

Battery operation time and calculation

The battery operation time depends on the connected battery pack as well as the operation condition of the meter.

MAG 8000 calculates the remaining capacity every 4 hours and includes all consuming elements. Calculation compensates for temperature influence on battery capacity.



The graphic shows the effect from other temperatures. A variation in temperature from 15 °C to 55 °C (59 to 131 °F) reduces the capacity by 17 % from 15 Ah to 12.5 Ah.

At typical revenue scenario of expected battery operation time can be seen in the table below.

The measurement for calculating the rest capacity of the battery life time is only completed if the system has no active fatal faults or the empty pipe is active. Maximum battery specification is 10 years operation.

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Scenario - Revenue application

Output A	Pulse rate max. 10 Hz
Output B	Alarm or call-up
Meter dialog	1 hour per month
Add-com	None
Temperature	<ul style="list-style-type: none"> • 5 % at 0 °C (32 °F) • 80 % at 15 °C (59 °F) • 15 % at 50 °C (122 °F)

Battery lifetime (subject to the assumptions mentioned above)

MAG 8000 for abstraction and distribution network applications (7ME6810) and MAG 8000 CT for revenue and bulk metering (7ME6820)

Excitation frequency (24 h operation)		1/60 Hz	1/30 Hz	1/15 Hz	1/5 Hz	1.5625 Hz	3.125 Hz	6.25 Hz
2 D-Cell battery 33 Ah Internal battery pack	DN 25 ... 200 (1" ... 8")	8 years	8 years	6 years	40 months	8 months	4 months	2 months
	DN 250 ... 600 (10" ... 24")	8 years	6 years	4 years	20 months	4 months	2 months	N/A
	DN 700 ... 1 200 (28" ... 48")	6 years	4 years	2 years	1 year	2 months	N/A	N/A
4 D-Cell battery 66 Ah External battery pack	DN 25 ... 200 (1" ... 8")	N/A	10 years	10 years	80 months	16 months	8 months	4 months
	DN 250 ... 600 (10" ... 24")	N/A	10 years	10 years	40 months	8 months	4 months	N/A
	DN 700 ... 1 200 (28" ... 48")	10 years	8 years	4 years	2 years	4 months	N/A	N/A

MAG 8000 for irrigation applications (7ME6880)

Excitation frequency (24 h operation)		1/60 Hz	1/30 Hz	1/15 Hz	1/5 Hz	1.5625 Hz	3.125 Hz
1 D-Cell battery Internal battery pack	DN 25 ... 600 (1" ... 24")	52 months	40 months	25 months	12 months	2 months	1 month
	DN 700 ... 1 200 (28" ... 48")	3 years	2 years	1 years	6 months	1 month	N/A
2 D-Cell battery 33 Ah Internal battery pack	DN 50 ... 600 (2" ... 24")	8 years	80 months	50 months	24 months	4 months	2 months
	DN 700 ... 1 200 (28" ... 48")	6 years	4 years	2 years	1 year	2 months	N/A
4 D-Cell battery 66 Ah External battery pack	DN 50 ... 600 (2" ... 24")	10 years	10 years	8 years	48 months	8 months	4 months
	DN 700 ... 1 200 (28" ... 48")	10 years	8 years	4 years	2 years	4 months	N/A

MAG 8000 GSM/GPRS battery lifetime scenario

Transmission once a day and MAG 8000 factory settings

2 D-Cell battery 33 Ah Internal battery pack	3 years
4 D-Cell battery 66 Ah Internal battery pack	7 years

External battery pack can be used as battery backup for mains power supply (if two cable entries in one cable gland are needed, order cable glands with two entries, see accessories on page 3/137).

Serial RS 232/RS 485 add-on communication modules are designed for mains powered systems as the battery operation time will be reduced. At 1 hour communication per month (all meter data collected 2 times per day) and the module is connected, the operation time is reduced to:

- RS 232 at low excitation frequency to 10 % and at high excitation frequency to 80 % of calculated operation time
- RS 485 at low excitation frequency to 50 % and at high excitation frequency to 90 % of calculated operation time

Overview



Benefits

Easy to install

- Compact or remote solution with factory mounted cable and customer setting from factory
- IP68/NEMA 6P enclosure. Sensor can be buried.
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities

Long-term stability/Low cost of ownership

- No moving parts in a robust construction means less wear and tear
- Basic and advanced transmitter versions with different optional add-on communication modules fulfil various customer requirements for high cost efficiency
- Up to 0.2 % maximum uncertainty
- Bi-directional measurement with an outstanding low flow performance
- Up to 10 years maintenance-free operation in typical applications

Intelligent information, easy to access

- Advanced information on site
- Advanced statistics and diagnostics
- Optional high-performance GSM/GPRS module offers an efficient solution for remote measurement and monitor via wireless communication.

Technical specifications

Meter	
Accuracy	Standard calibration: ± 0.4 % of rate ± 2 mm/s Extended calibration DN 50 ... DN 300 (2" ... 12"): ± 0.2 % of rate ± 2 mm/s
Low flow cut-off (default)	0.05 %
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0 ... 70 °C (32 ... 158 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F)
Enclosure rating	
Remote sensor	IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Compact version	IP68 to EN 60529/NEMA 6P, 3 mH ₂ O for six months
Certificates and approvals	
Calibration	
• Standard calibration	2 x 25 % and 2 x 90 % (default)
• Special calibration	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point, 10-point
Material certificate EN 10204-3.1	Available when ordering together with meter ¹⁾
Drinking water approvals	<ul style="list-style-type: none"> • NSF/ANSI Standard 61²⁾ (cold water) USA • WRAS (BS 6920 cold water) UK • ACS Listed France • DVGW W270 Germany • Belgaqua (B) • MCERTS (GB)
Fire Service Approvals	FM Fire Service Meter (Class Number 1044) ³⁾
Conformity	<ul style="list-style-type: none"> • PED: 97/23EC⁴⁾ For pressure/temperature curves see MAG 3100 on page 3/70. <ul style="list-style-type: none"> • EMC: IEC/EN 61326
Sensor version	DN 25 ... 1200 (1" ... 48")
Sensor material	Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4, according to ISO 12944-2
Measuring principle	
Electromagnetic induction	
Excitation frequency	
Basic version	
• Battery-powered	DN 25 ... 150 (1" ... 6"): 1/15 Hz DN 200 ... 600 (8" ... 24"): 1/30 Hz DN 700 ... 1200 (28" ... 48"): 1/60 Hz
• Mains-powered	DN 25 ... 150 (1" ... 6"): 6.25 Hz DN 200 ... 600 (8" ... 24"): 3.125 Hz DN 700 ... 1200 (28" ... 48"): 1.5625 Hz

Flow Measurement

SITRANS F M

MAG 8000 for abstraction and distribution network applications (7ME6810)

Advanced version

- | | |
|-------------------|---|
| • Battery-powered | DN 25 ... 150 (1" ... 6"): 1/15 Hz
(adjustable up to 6.25 Hz; reduced battery lifetime)
DN 200 ... 600 (8" ... 24"): 1/30 Hz
(adjustable up to 3.125 Hz; reduced battery lifetime)
DN 700 ... 1200 (28" ... 48"): 1/60 Hz
(adjustable up to 1.5625 Hz; reduced battery lifetime) |
| • Mains-powered | DN 25 ... 150 (1" ... 6"): 6.25 Hz
DN 200 ... 600 (8" ... 24"): 3.125 Hz
DN 700 ... 1200 (28" ... 48"): 1.5625 Hz |

Flanges

EN 1092-1 (DIN 2501)	DN 25 and DN 40 (1" and 1½"): PN 40 (580 psi) DN 50 ... 150 (2" ... 6"): PN 16 (232 psi) DN 200 ... 1200 (8" ... 48"): PN 10 or PN 16 (145 psi or 232 psi)
ANSI 16.5 Class 150	1" ... 24": 20 bar (290 psi)
AWWA C-207	28" ... 48": PN 10 (145 psi)
AS 4087	DN 50 ... 1200 (2" ... 48"): PN 16 (232 psi)

Liner

EPDM

Electrode and grounding electrodes

Hastelloy C276/2.4819

Grounding straps

Grounding straps are premounted from the factory on each side of the sensor.

- 1) Has to be ordered with the meter. It is not possible to order the certificate afterwards.
- 2) Including Annex G
- 3) Not for sensors with 300 µm coating.
- 4) For further information on the PED standard and requirements see page 9/6.

MAG 8000 for abstraction and distribution network applications (7ME6810)

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter	7 ME 6 8 1 0 -
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	
Diameter	
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 65 (2½")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
DN 125 (5")	4 B
DN 150 (6")	4 H
DN 200 (8")	4 P
DN 250 (10")	4 V
DN 300 (12")	5 D
DN 350 (14")	5 K
DN 400 (16")	5 R
DN 450 (18")	5 Y
DN 500 (20")	6 F
DN 600 (24")	6 P
DN 700 (28") ¹⁾	6 Y
DN 750 (30") ¹⁾	7 D
DN 800 (32") ¹⁾	7 H
DN 900 (36") ¹⁾	7 M
DN 1000 (40") ¹⁾	7 R
DN 1050 (42") ¹⁾	7 U
DN 1100 (44") ¹⁾	7 V
DN 1200 (48") ¹⁾	8 B
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 1200 (8" ... 48"))	B
PN 16 (DN 50 ... 1200 (2" ... 48"))	C
PN 16 non-PED (DN 700 ... 1200 (28" ... 48"))	D
PN 40 (DN 25 ... 40 (1" ... 1½"))	F
ANSI B16.5	
Class 150	J
AWWA C-207	
Class D (28" ... 48")	L
AS4087	
PN 16 (DN 50 ... 1200 (2" ... 48"))	N
Sensor version	
EPDM liner and Hastelloy electrodes, 150 µm coating	3
EPDM liner and Hastelloy electrodes, 300 µm coating	4
Calibration	
Standard ± 0.4 % of rate ± 2 mm/s	1
Extended ± 0.2 % of rate ± 2 mm/s DN 50... 300 (2" ... 12")	2
Region version	
Europe (m³, m³/h, 50 Hz)	1
USA (Gallon, GPM, 60 Hz)	2
Australia (ML, MI/d, 50 Hz)	3
Transmitter type and installation	
Basic version integral on sensor	A
Basic version, remote cables mounted on sensor with IP68/NEMA 6P plugs:	
• 5 m (16.4 ft)	B
• 10 m (32.8 ft)	C
• 20 m (65.6 ft)	D
• 30 m (98.4 ft)	E
Advanced version integral on sensor	K

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter	7 ME 6 8 1 0 -
<p>Advanced version, remote cables mounted on sensor with IP68/NEMA 6P plugs:</p> <ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 20 m (65.6 ft) • 30 m (98.4 ft) 	
Communication interface	
No additional "add-on" communication module installed	A
Serial RS 485 with Modbus RTU (Terminated as end device)	B
Serial RS 232 with Modbus RTU	C
Encoder interface with Sensus protocol	D
GSM/GPRS communication module with remote antenna; 5 m (16.4 ft) cable	S
GSM/GPRS communication module with analog inputs and remote antenna; 5 m (16.4 ft) cable	T
Power supply	
Internal battery (no battery included)	0
Internal battery pack installed ²⁾	1
Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (no battery included)	2
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	3
115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	4
<p>¹⁾ The Diameter DN 700 (28") to DN 1200 (48") is only available as remote transmitter type installation.</p> <p>²⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.</p> <p>➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.</p>	
Operating instructions for SITRANS F M MAG 8000	
Description	Article No.
• English	A5E03071515
• German	A5E00740986
• Spanish	A5E00741031
• French	A5E00741021

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Operating instructions for MAG 8000 GSM/GPRS communication module

Description	Article No.
• English	A5E03644134

Flow Measurement

SITRANS F M

MAG 8000 for abstraction and distribution network applications (7ME6810)

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information		Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.		Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Certificate		Certificate	
Material certificate according to EN 10204-3.1	C12¹⁾	G x 100	L46
		CF x 100	L47
		MG	L48
		G x 1000	L49
		CF x 1000	L50
		AI	L51
		kl	L52
		BBL42 (US oil barrel, 1 barrel = 42 US gallons)	L54
Special calibration		Pulse set up	
5-point calibration for DN 15 ... DN 200 ²⁾	D01	(default pulse A = forward and pulse B = Alarm, pulse width = 50 ms)	
5-point calibration for DN 250 ... DN 600 ²⁾	D02	A function = RV, reverse flow	L62
5-point calibration for DN 700 ... DN 1200 ²⁾	D03	A function = FWnet, forward net flow	L63
10-point calibration for DN 15 ... DN 200 ³⁾	D06	A function = RVnet, reverse net flow	L64
10-point calibration for DN 250 ... DN 600 ³⁾	D07	A function = Off	L65
10-point calibration for DN 700 ... DN 1200 ³⁾	D08	Volume per pulse A = x 0.0001 ⁴⁾	L70
Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200	D11	Volume per pulse A = x 0.001 ⁴⁾	L71
Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600	D12	Volume per pulse A = x 0.01 ⁴⁾	L72
Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200	D13	Volume per pulse A = x 0.1 ⁴⁾	L73
5-point, matched-pair calibration for DN 15 ... DN 200 ²⁾	D15	Volume per pulse A = x 1 ⁴⁾	L74
5-point, matched-pair calibration for DN 250 ... DN 600 ²⁾	D16	B function = FW, forward flow	L80
5-point, matched-pair calibration for DN 700 ... DN 1200 ²⁾	D17	B function = RV, reverse flow	L81
10-point, matched-pair calibration for DN 15 ... DN 200 ³⁾	D18	B function = FWnet, forward net flow	L82
10-point, matched-pair calibration for DN 250 ... DN 600 ³⁾	D19	B function = RVnet, reverse net flow	L83
10-point, matched-pair calibration for DN 700 ... DN 1200 ³⁾	D20	B function = Alarm	L84
		B function = Call up	L85
Flow unit		Data logger set up (default month logging)	
l/s	L00	Volume per pulse B = x 0.0001 ⁴⁾	L90
MGD	L01	Volume per pulse B = x 0.001 ⁴⁾	L91
CFS	L02	Volume per pulse B = x 0.01 ⁴⁾	L92
l/min	L03	Volume per pulse B = x 0.1 ⁴⁾	L93
m ³ /min	L04	Volume per pulse B = x 1 ⁴⁾	L94
GPM	L05		
CFM	L06	DataloggerInterval = Daily	M31
l/h	L07	DataloggerInterval = Weekly	M32
m ³ /h	L08	Factory mounted cables	
GPH	L09	5 m (16.4 ft) pulse cable A+B	M81
CFH	L10	5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	M82
GPS	L11	20 m (65.6 ft) pulse cable A+B	M84
MI/d	L12	20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	M85
m ³ /d	L13	Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	M87
GPD	L14	Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	M89
BBL42/s	L15	Encoder interface cable with connector for ITRON 200WP radio, length 25 ft	M90
BBL42/min	L16	Encoder interface cable with connector for ITRON 200WP radio, length 5 ft	M91
BBL42/h	L17	SOFREL data logger cable 2 m with connector for SOFREL GSM module	M92
BBL42/d	L18		
Totalizer		FM Fire Service Approval	
Volume calculation (default totalizer 1 = forward and totalizer 2 = reverse)		(with ANSI B16.5 Class 150 flanges)	
Totalizer 1 = RV, reverse flow	L20	DN 50, DN 80 and DN 100 (2", 3" and 4")	P20
Totalizer 1 = NET, net flow	L22	DN 150 and DN 200 (6" and 8")	P21
Totalizer 2 = FW, forward flow	L30	DN 250 and DN 300 (10" and 12")	P22
Totalizer 2 = NET, net flow	L31		
Volume unit		1) Under preparation	
m ³	L40	2) 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max}	
MI	L41	3) Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max}	
G	L42	4) Pulse width = 10 ms	
AF	L43		
l x 100	L44		
m ³ x 100	L45		

Overview



Benefits

Approvals

- MI-001, OIML R 49/OIML R 49 MAA
- PTB K7.2
- FM Fire Service

Easy to install

- Compact or remote solution with factory mounted cable and customer setting from factory
- IP68/NEMA 6P enclosure. Sensor can be buried
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities

Long-term stability/Low cost of ownership

- No moving parts in a robust construction means less wear and tear
- Basic and advanced transmitter versions with different optional add-on communication modules fulfil various customer requirements for high cost efficiency
- Bi-directional measurement with an outstanding low flow performance
- Up to 10 years maintenance-free operation in typical applications
- Insignificant pressure drop

Intelligent information, easy to access

- Advanced information on site
- Advanced statistics and diagnostics
- Connectable to common AMR systems

Technical specifications

Meter	
Accuracy	OIML R 49/OIML R 49 MAA for DN 50 ... DN 300 (2" ... 12"), Class I and II with turn down up to Q3/Q1 = 400 at Q2/Q1 = 1.6 MI-001 verification for DN 50 ... DN 400 (2" ... 16"), Class II with turn down ratio Q3/Q1 = 250, Q3/Q1 = 200 or Q3/Q1 = 160 at Q2/Q1 = 1.6 FM Fire Service for DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") ± 1.5% (Q _{min} to Q _{max})
Low flow cut-off (default)	0.25 %
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F) MI-001: -25 ... +55 °C (-13 ... +131 °F)
Media	0.1 ... 50 °C (32 ... 122 °F)
Storage	-40 ... +70 °C (-22 ... +158 °F)
Enclosure rating	
Remote sensor	IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Compact version	IP68 to EN 60529/NEMA 6P, 3 mH ₂ O for six months
Certificates and approvals	
Calibration (standard)	2 x 25 % and 2 x 90 %
Material certificate EN 10204 3.1	Available when ordering together with meter ¹⁾
Drinking water approvals	<ul style="list-style-type: none"> • NSF/ANSI Standard 61²⁾ (cold water) USA • WRAS (BS 6920 cold water) UK • ACS Listed France • DVGW W270 Germany • Belgaqua (B) • MCERTS (GB)
Fire Service approval	FM Fire Service (1044) ³⁾
Custody transfer approval	<ul style="list-style-type: none"> • OIML R 49 and OIML R 49 MAA approval (DN 50 ... DN 300 (2" ... 12")) • MI-001 approval (DN 50 ... DN 600 (2" ... 24")) (DK-0200-MI-001-011)
Conformity	<ul style="list-style-type: none"> • CEN EN 14154, ISO 4064 • PED: 97/23/EC⁴⁾ For pressure/temperature curves, see MAG 3100 on page 3/70. <ul style="list-style-type: none"> • EMC: IEC/EN 61326
Sensor version	DN 50 ... 600 (2" ... 24")
Sensor material	Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4, according to ISO 12944-2
Measuring principle	
Electromagnetic induction	
Excitation frequency	
Basic version	
• Battery-powered	DN 50 ... 150 (2" ... 6"): 1/15 Hz DN 200 ... 600 (8" ... 24"): 1/30 Hz
• Mains-powered	DN 50 ... 150 (2" ... 6"): 6.25 Hz DN 200 ... 600 (8" ... 24"): 3.125 Hz

Flow Measurement

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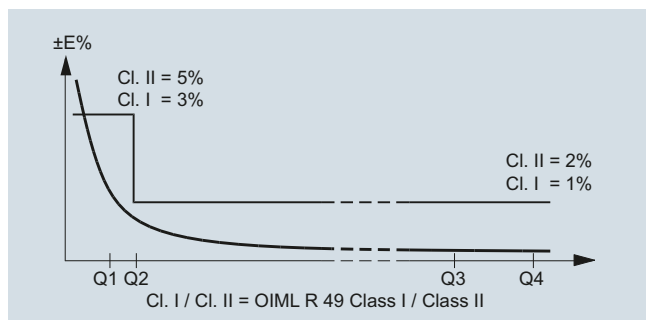
MAG 8000 CT for revenue and bulk metering (7ME6820)

Advanced version	
• Battery-powered	DN 50 ... 150 (2" ... 6"): 1/15 Hz (adjustable up to 6.25 Hz; reduced battery lifetime) DN 200 ... 600 (8" ... 24"): 1/30 Hz (adjustable up to 3.125 Hz; reduced battery lifetime)
• Mains-powered	DN 50 ... 150 (2" ... 6"): 6.25 Hz DN 200 ... 600 (8" ... 24"): 3.125 Hz
Flanges	
EN 1092-1 (DIN 2501)	DN 50 ... 150 (2" ... 6"): PN 16 (232 psi) DN 200 ... 300 (8" ... 12"): PN 10 or PN 16 (145 psi or 232 psi) up to DN 600 (24") in preparation
ANSI 16.5 Class 150	2" ... 12": 20 bar (290 psi) up to DN 600 (24") in preparation
AWWA C-207	28" ... 48": PN 10 (145 psi)
AS 4087	DN 50 ... 300 (2" ... 12"): PN 16 (232 psi) up to DN 600 (24") in preparation
Liner	EPDM
Electrode and grounding electrodes	Hastelloy C276/2.4819
Grounding straps	Grounding straps are premounted from the factory on each side of the sensor

- 1) Has to be ordered with the meter. It is not possible to order the certificate afterwards.
- 2) Including Annex G
- 3) Not for sensors with 300 µm coating.
- 4) For further information on the PED standard and requirements see page 9/6.

MAG 8000 CT (Revenue program) water meter type approval

MAG 8000 CT program is type approved and verified according to international water meter standard OIML R 49. The Custody Transfer program is approved as Class I and Class II, for the sensor program from DN 50 to DN 300, at different Q3 and Q3/Q1. Q2/Q1 = 1.6 and follows OIML R 49 specification.



OIML R 49/2006-DK2-10.01 Revision 1 approval specification for Class I (1 %)¹⁾

Size	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	250	250	250	250	250	250	250	250	125	-	-	-	-	-
Q1 [m³/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	12.8	-	-	-	-	-
Q2 [m³/h]	0.40	0.64	1.00	1.60	2.60	4.00	6.40	10.24	20.48	-	-	-	-	-
Q3 [m³/h]	63	100	160	250	400	630	1000	1600	1600	-	-	-	-	-
Q4 [m³/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000	-	-	-	-	-

OIML R 49/2006-DK2-10.01 Revision 1 approval specification for Class II (2 %)¹⁾

Size	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	400	400	400	400	400	400	400	400	200	-	-	-	-	-
Q1 [m³/h]	0.16	0.25	0.40	0.63	1.00	1.60	2.50	4.00	10.00	-	-	-	-	-
Q2 [m³/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	16.00	-	-	-	-	-
Q3 [m³/h]	63	100	160	250	400	630	1000	1600	1600	-	-	-	-	-
Q4 [m³/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000	-	-	-	-	-

¹⁾ The product will be delivered according to requested specifications, which may deviate from the specifications of the approval frame described in tables below.

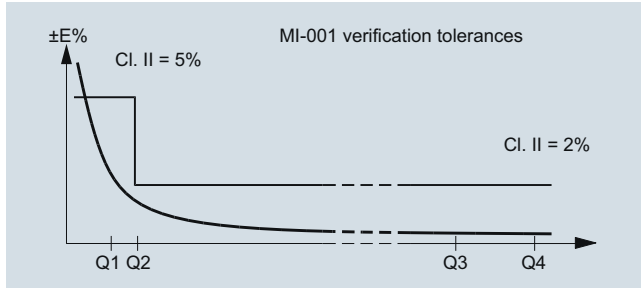
MAG 8000 CT (Revenue program) MI-001

MAG 8000 CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 8000 CT MI-001 verified and labeled products are a Class II approval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 400. The MID certification is obtained as a B + D module approval according to the above mentioned directive.

Module B : Type approval according to OIML R 49

Module D : Quality insurance approval of production



MAG 8000 CT MI-001 verified and labeled products at a given Q3 and Q4/Q3 = 1.25 and Q2/Q1 = 1.6 measuring ranges see below table:

7ME6820-xxxx1	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	1250	2000	3125
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	1000	1600	2500
Q2 [m³/h]	0.96	1.60	2.60	4.03	6.40	10.24	16	25.60	38.4	64	64	64	102.4	160
Q1 [m³/h]	0.60	1	1.60	2.52	4	6.40	10	16	24	40	40	40	64	100

7ME6820-xxxx2	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63	63	63	63	63	63
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	3125	3125	5000
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	2500	2500	4000
Q2 [m³/h]	0.41	0.63	1.02	1.60	2.54	4.06	6.35	10.16	16	25.4	25.4	63.49	63.49	101.6
Q1 [m³/h]	0.25	0.40	0.63	1	1.59	2.54	3.97	6.35	10	15.9	15.9	39.68	39.68	63.49

7ME6820-xxxx3	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	5000	5000	7875
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	4000	4000	6300
Q2 [m³/h]	0.32	0.50	0.80	1.20	2	3.20	5	8	12.6	20	20	80	80	126
Q1 [m³/h]	0.20	0.31	0.50	0.75	1.25	2	3.13	5	7.88	12.5	12.5	50	50	78.75

7ME6820-xxxx4	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160	160	160	-	160	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	2000	2000	-	7875	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600	1600	1600	-	6300	-
Q2 [m³/h]	0.40	0.63	1	1.60	2.50	4	6.30	10	16	16	16	-	63	-
Q1 [m³/h]	0.25	0.39	0.63	1	1.56	2.50	3.94	6.25	10	10	10	-	39.38	-

7ME6820-xxxx5	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	200	200	200	200	200	200	200	200	-	-	-	-	-	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	-	-	-	-	-	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	-	-	-	-	-	-
Q2 [m³/h]	0.32	0.50	0.80	1.28	2	3.20	5.04	8	-	-	-	-	-	-
Q1 [m³/h]	0.20	0.32	0.50	0.80	1.25	2	3.15	5	-	-	-	-	-	-

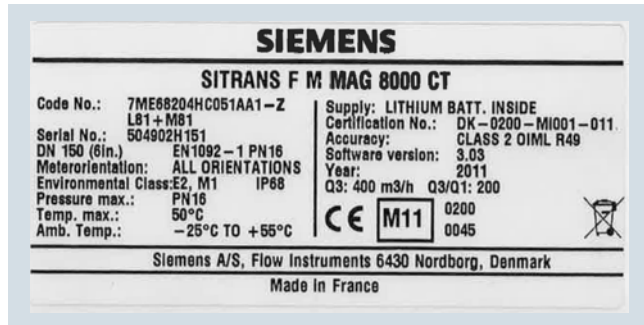
Flow Measurement

SITRANS F M

MAG 8000 CT for revenue and bulk metering (7ME6820)

7ME6820- xxxx6	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	250	250	250	250	250	250	250	250	-	-	-	-	-	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	-	-	-	-	-	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	-	-	-	-	-	-
Q2 [m³/h]	0.26	0.40	0.64	1.02	1.60	2.56	4	6.40	-	-	-	-	-	-
Q1 [m³/h]	0.16	0.25	0.40	0.64	1	1.60	2.52	4	-	-	-	-	-	-

The Label is placed on the side of the encapsulation.
An example of the product label is shown below:



Installation conditions

Please refer to "System information SITRANS F M electromagnetic flowmeters".

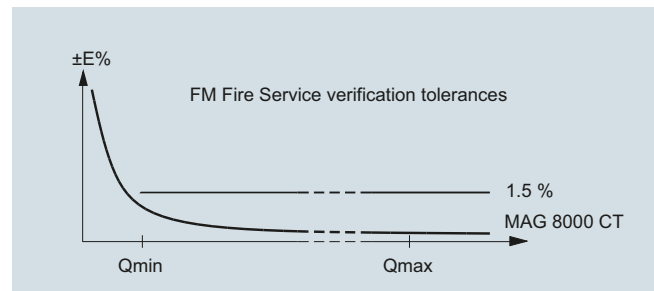
Battery operation time and calculation

The battery operation time depends on the connected battery pack as well as the operation condition of the meter.

MAG 8000 calculates the remaining capacity every 4 hours and includes all consuming elements. Calculation compensates for temperature influence on battery capacity (drawing).

MAG 8000 CT (7ME6820) for Fire Service applications

MAG 8000 CT (7ME6820) is FM Fire Service approved for automatic fire protection systems according to the Fire Service Meters Standard, Class Number 1044. The approval is applicable for the sizes DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges. The FM Fire Service approved product can be ordered via the Z-options P20, P21 and P22.



MAG 8000 CT for revenue and bulk metering (7ME6820)

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS F M		SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 0 -	MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 0 -
<p>↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>			
Diameter		Communication interface	
DN 50 (2")	2 Y	No additional "add-on" communication module installed	A
DN 65 (2½")	3 F	Serial RS 485 with Modbus RTU (Terminated as end device)	B
DN 80 (3")	3 M	Serial RS 232 with Modbus RTU	C
DN 100 (4")	3 T	Encoder interface for ITRON 200WP radio with "Sensus" protocol	D
DN 125 (5")	4 B	GSM/GPRS module without analog inputs cable	S
DN 150 (6")	4 H	GSM/GPRS module with analog inputs cable	T
DN 200 (8")	4 P		
DN 250 (10")	4 V	Power supply	
DN 300 (12")	5 D	Internal battery (no battery included)	0
DN 350 (14") ¹⁾	5 K	Internal battery pack installed ²⁾	1
DN 400 (16") ¹⁾	5 R	Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (no battery included)	2
DN 450 (18") ¹⁾	5 Y	12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	3
DN 500 (20") ¹⁾	6 F	115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (no battery included)	4
DN 600 (24") ¹⁾	6 P		
Flange norm and pressure rating		<ol style="list-style-type: none"> Under preparation. Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs. For more details and references of the ranges please see the tables on pages 3/126 to 3/128. Standard calibration or according to FM Fire Service requirements if P20, P21 or P22 is selected as Z option. 	
EN 1092-1	C		
PN 16			
ANSI B16.5	J		
Class 150			
AS4087	N		
PN 16			
Sensor version			
EPDM liner and Hastelloy electrodes, 150 µm coating	0		
EPDM liner and Hastelloy electrodes, 300 µm coating	4		
Approval/Verification³⁾			
Without verification according to OIML R 49 ⁴⁾	0		
MI-001 Q3/Q1 = 25	1		
MI-001 Q3/Q1 = 63	2		
MI-001 Q3/Q1 = 80	3		
MI-001 Q3/Q1 = 160	4		
MI-001 Q3/Q1 = 200	5		
MI-001 Q3/Q1 = 250	6		
Without verification calibrated to OIML R 49-Class II (Q3/Q1 = 100)	7		
Without verification calibrated to OIML R 49-Class II (Q3/Q1 = 250)	8		
Region version			
Europe (m ³ , m ³ /h, 50 Hz)	1		
USA (m ³ , m ³ /h, 60 Hz)	2		
Transmitter type and installation			
Basic version integral on sensor	A		
Basic version, remote cables mounted on sensor with IP68/NEMA 6P plugs			
5 m (16.4 ft)	B		
10 m (32.8 ft)	C		
20 m (65.6 ft)	D		
30 m (98.4 ft)	E		
Advanced version integral on sensor	K		
Advanced version, remote cables mounted on sensor with IP68/NEMA 6P plugs			
5 m (16.4 ft)	L		
10 m (32.8 ft)	M		
20 m (65.6 ft)	N		
30 m (98.4 ft)	P		
		Operating instructions for SITRANS F M MAG 8000	
		Description	Article No.
		English	A5E03071515
		German	A5E00740986
		Spanish	A5E00741031
		French	A5E00741021
		This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.	
		All literature is also available for free at: http://www.siemens.com/flowdocumentation	
		Operating instructions for MAG 8000 GSM/GPRS communication module	
		Description	Article No.
		English	A5E03644134

Flow Measurement

SITRANS F M

MAG 8000 CT for revenue and bulk metering (7ME6820)

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Material certificate according to EN 10204-3.1	C12¹⁾
FP2E marking (France only)	C17
Totalizer	
Volume calculation (default totalizer 1= forward and totalizer 2 = reverse)	
Totalizer 1 = RV, reverse flow	L20
Totalizer 1 = NET, net flow	L22
Totalizer 2 = FW, forward flow	L30
Totalizer 2 = NET, net flow	L31
Pulse set up	
(default pulse A = forward and pulse B = Alarm, pulse width = 50 ms)	
A function = RV, reverse flow	L62
A function = FWnet, forward net flow	L63
A function = RVnet, reverse net flow	L64
A function = Off	L65
Volume per pulse A = x 0.001 ²⁾	L71
Volume per pulse A = x 0.01 ²⁾	L72
Volume per pulse A = x 0.1 ²⁾	L73
Volume per pulse A = x 1 ²⁾	L74
B function = FW, forward flow	L80
B function = RV, reverse flow	L81
B function = FWnet, forward net flow	L82
B function = RVnet, reverse net flow	L83
B function = Alarm	L84
B function = Call up	L85
Volume per pulse B = x 0.001 ²⁾	L91
Volume per pulse B = x 0.01 ²⁾	L92
Volume per pulse B = x 0.1 ²⁾	L93
Volume per pulse B = x 1 ²⁾	L94
Data logger set up (default month logging)	
DataloggerInterval = Daily	M31
DataloggerInterval = Weekly	M32
Factory mounted cables	
5 m (16.4 ft) pulse cable A+B	M81
5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	M82
20 m (65.6 ft) pulse cable A+B	M84
20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	M85
Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	M87
Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	M89
5 ft. Encoder interface cable with connector for ITRON 200WP radio	M91
25 ft. Encoder interface cable with connector for ITRON 200WP radio	M90
SOFREL data logger cable 2 m with connector for SOFREL GSM module	M92
FM Fire Service Approval	
(with ANSI B16.5 Class 150 flanges)	
DN 50, DN 80 and DN 100 (2", 3" and 4")	P20
DN 150 and DN 200 (6" and 8")	P21
DN 250 and DN 300 (10" and 12")	P22

¹⁾ Under preparation

²⁾ Pulse width = 10 ms

Overview



Benefits

- IP68/NEMA 6P rating with tamper proof
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities
- No moving parts in a robust construction means less wear and tear
- Up to 8 years maintenance-free operation in typical application
- Connectable to AMR systems
- Adaptor for conduit installation to provide a clean, protected pathway for device cables

Technical specifications

Meter	
Accuracy	± 0.8 % ± 2.5 mm/s ± 0.4 % ± 2.5 mm/s NMI (class 2.5)
Low flow cut-off (default)	1.0 %
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0 ... 70 °C (32 ... 158 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F)
Enclosure rating	
Remote sensor	IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Compact version	IP68 to EN 60529/NEMA 6P, 3 mH ₂ O for six months
Approvals	
Drinking water approvals	<ul style="list-style-type: none"> • ANSI/NSF 61¹⁾ (cold water) USA • WRAS (BS 6920 cold water) UK
Custody transfer approval	NMI10 Australia
Sensor material	Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4, according to ISO 12944-2
Conformity	IEC/EN 61326
Flanges	
EN 1092-1 (DIN 2501) PN 10 drilled pattern	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
ANSI 16.5 Class 150 drilled pattern	2" ... 24" (max. pressure 7 bar (101.5 psi))
AS 2091-1 Table D drilled pattern	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
AS 2129	DN 25, DN 40, DN 125 (1", 1½", 5")
AS 4087 PN 16	DN 50 ... DN 1200 (2" ... 48")
Excitation frequency	
Battery-powered	DN 50 ... 600 (2" ... 24"): 1/15 Hz DN 700 ... 1200 (28" ... 48"): 1/60 Hz
Mains-powered	DN 50 ... 600 (2" ... 24"): 3.125 Hz DN 700 ... 1200 (28" ... 48"): 1.5625 Hz
Liner	Ebonite
Electrodes	Stainless steel

¹⁾ Including Annex G

Flow Measurement

SITRANS F M

MAG 8000 for irrigation applications

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	7 ME 6 8 8 0 -
<p>↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	
Diameter	
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 65 (2½")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
DN 125 (5")	4 B
DN 150 (6")	4 H
DN 200 (8")	4 P
DN 250 (10")	4 V
DN 300 (12")	5 D
DN 350 (14")	5 K
DN 400 (16")	5 R
DN 450 (18")	5 Y
DN 500 (20")	6 F
DN 600 (24")	6 P
DN 700 (28")	6 Y
DN 750 (30")	7 D
DN 800 (32")	7 H
DN 900 (36")	7 M
DN 1000 (40")	7 R
DN 1050 (42")	7 U
DN 1100 (44")	7 V
DN 1200 (48")	8 B
Flange norm and pressure rating	
EN 1092-1 drilled pattern PN 10/max. 7 bar (101 psi)	B
ANSI B16.5 drilled pattern CI 150/max. 7 bar (101 psi)	J
AS2129 drilled pattern table D/max. 7 bar (101 psi)	M
AS2129 table E (DN 25, DN 40, DN 125)	G
AS4087 PN 16 (DN 50 ... DN 1200)	N
Sensor version	
Ebonite liner and stainless steel electrodes	4
Region version	
Europe (m ³ , m ³ /h, 50 Hz)	1
USA (Gallon, GPM, 60 Hz)	2
Australia (MI, MI/d, 50 Hz)	3
Transmitter type and installation	
Basic version integral on sensor	A
Basic version, remote cables mounted on sensor with IP68/NEMA 6P plugs	
2 m (6.56 ft)	T
5 m (16.4 ft)	B
10 m (32.8 ft)	C
20 m (65.6 ft)	D
30 m (98.4 ft)	E

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	7 ME 6 8 8 0 -
Communication interface	
No additional "add-on" communication module installed	A
Serial RS 485 with Modbus RTU (Terminated as end device)	B
Serial RS 232 with Modbus RTU	C
Encoder interface	D
GSM module with remote antenna and 5 m cable	S
GSM module with analog input, remote antenna and 5 m cable	T
Power supply	
Internal battery (no battery included)	0
Internal battery pack installed 2 D-cell ^{1) 2)}	1
Power cable (1.5 m (4.9 ft) with IP68/NEMA 6P plugs for external battery (no battery included)	2
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	3
115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	4
Internal battery pack installed 1 D-cell ^{1) 2)}	5

¹⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

²⁾ Can be ordered by US region only.

Operating instructions for SITRANS F M MAG 8000

Description	Article No.
• English	A5E03071515
• German	A5E00740986
• Spanish	A5E00741031
• French	A5E00741021

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

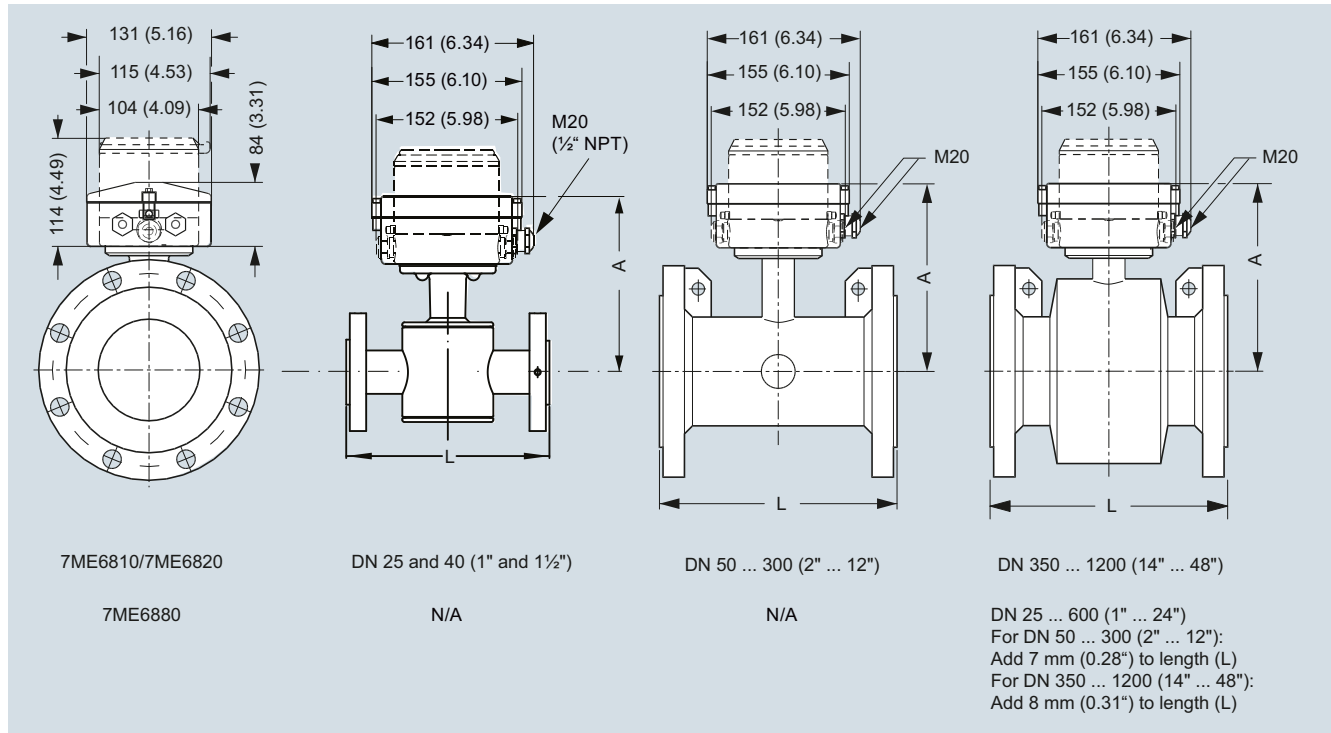
Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information		Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.		Please add “-Z” to Article No. and specify Order code(s) and plain text.	
<u>Flow unit</u>		<u>Volume per pulse B = x 0.0001¹⁾</u>	
l/s	L00	Volume per pulse B = x 0.001 ¹⁾	L90
MGD	L01	Volume per pulse B = x 0.01 ¹⁾	L91
CFS	L02	Volume per pulse B = x 0.1 ¹⁾	L92
l/min	L03	Volume per pulse B = x 0.1 ¹⁾	L93
m ³ /min	L04	Volume per pulse B = x 1 ¹⁾	L94
GPM	L05	<u>Device operation</u>	
CFM	L06	Only operator menu activated	
l/h	L07	<u>Data logger set up</u> (default month logging)	
m ³ /h	L08	DataloggerInterval = Daily	
GPH	L09	DataloggerInterval = Weekly	
CFH	L10	<u>Factory mounted cables</u>	
GPS	L11	5 m (16.4 ft) pulse cable A+B	
Ml/d	L12	5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	
m ³ /d	L13	20 m (65.6 ft) pulse cable A+B	
GPD	L14	20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	
<u>Totalizer</u>		Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	
Volume calculation (default totalizer 1= forward and totalizer 2 = reverse)		Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	
Totalizer 1 = RV, reverse flow	L20	5 ft Encoder interface cable with connector for ITRON 200WP radio	
Totalizer 1 = NET, net flow	L22	25 ft Encoder interface cable with connector for ITRON 200WP radio	
Totalizer 2 = FW, forward flow	L30	SOFREL data logger cable 2 m with connector for SOFREL GSM module	
Totalizer 2 = NET, net flow	L31	Adaptors for conduit installation	
<u>Volume unit</u>		M81	
m ³	L40	M82	
Ml	L41	M84	
G	L42	M85	
AF	L43	M87	
l x 100	L44	M89	
m ³ x 100	L45	M91	
G x 100	L46	M90	
CF x 100	L47	M92	
MG	L48	M94	
G x 1000	L49		
CF x 1000	L50		
Al	L51		
kl	L52		
<u>Pulse set up</u>		1) Pulse width = 10 ms	
(default pulse A = forward and pulse B = Alarm, pulse width = 50 ms)			
A function = RV, reverse flow	L62		
A function = FWnet, forward net flow	L63		
A function = RVnet, reverse net flow	L64		
A function = Off	L65		
Volume per pulse A = x 0.0001 ¹⁾	L70		
Volume per pulse A = x 0.001 ¹⁾	L71		
Volume per pulse A = x 0.01 ¹⁾	L72		
Volume per pulse A = x 0.1 ¹⁾	L73		
Volume per pulse A = x 1 ¹⁾	L74		
Pulse A pulse width 5 ms (volume per pulse x 1)	L75		
Pulse A pulse width 10 ms (volume per pulse x 1)	L76		
Pulse A pulse width 50 ms (volume per pulse x 1)	L77		
Pulse A pulse width 100 ms (volume per pulse x 1)	L78		
Pulse A pulse width 500 ms (volume per pulse x 1)	L79		
B function = FW, forward flow	L80		
B function = RV, reverse flow	L81		
B function = FWnet, forward net flow	L82		
B function = RVnet, reverse net flow	L83		
B function = Alarm	L84		
B function = Call up	L85		

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Dimensional drawings

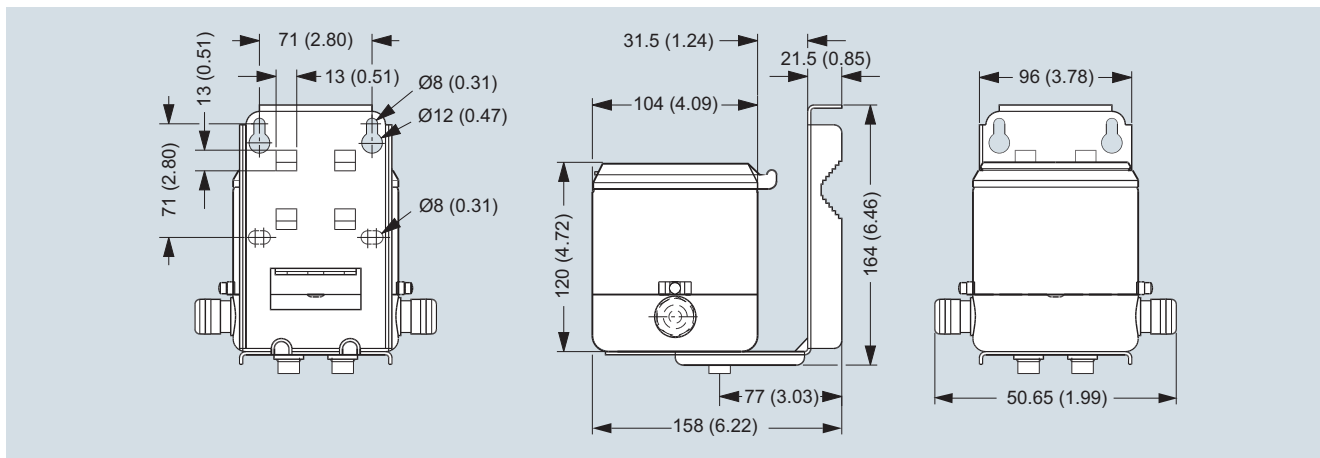


Dimensions in mm (inch)

Nominal DN size	A	L, lengths							Weight ¹⁾	
		EPDM (7ME6810 and 7ME6820)	EN 1092-1 PN 10	EN 1092-1 PN 16/ PN 16 non-PED	EN 1092-1 PN 40	ANSI 16.5 Class 150	AS 4087 PN 16	AWWA C-207 Class D		
mm (inch)	mm (inch)	mm	mm	mm	inch	mm	mm	mm	kg	lb
25 (1)	188 (7.4)	-	-	200	7.9	200	-	200	6	13
40 (1½)	203 (8.0)	-	-	200	7.9	200	-	200	9	20
50 (2)	178 (7.0)	-	200	-	7.9	200	-	-	11	25
65 (2½)	181 (7.1)	-	200	-	7.9	200	-	-	13	29
80 (3)	191 (7.5)	-	200	-	7.9	200	-	-	15	34
100 (4)	197 (7.8)	-	250	-	9.8	250	-	-	17	38
125 (5)	210 (8.3)	-	250	-	9.8	250	-	250	22	50
150 (6)	224 (8.8)	-	300	-	11.8	300	-	-	28	63
200 (8)	249 (9.8)	350	350	-	13.8	350	-	-	50	113
250 (10)	276 (10.9)	450	450	-	17.7	450	-	-	71	160
300 (12)	303 (11.9)	500	500	-	19.7	500	-	-	88	198
350 (14)	365 (14.4)	550	550	-	21.7	550	-	-	127	279
400 (16)	391 (15.4)	600	600	-	23.6	600	-	-	145	318
450 (18)	421 (16.6)	600	600	-	23.6	600	-	-	175	384
500 (20)	447 (17.6)	600	600	-	26.8	600	-	-	225	494
600 (24)	497 (19.6)	600	600	-	32.3	600	-	-	340	747
700 (28)	548 (21.6)	700	875/700	-	N/A	700	700	-	316	694
750 (30)	573 (22.6)	N/A	N/A	-	N/A	N/A	750	-	N/A	N/A
800 (32)	603 (23.7)	800	1000/800	-	N/A	800	800	-	398	1045
900 (36)	656 (25.8)	900	1125/900	-	N/A	900	900	-	476	1045
1000 (40)	708 (27.9)	1000	1250/1000	-	N/A	1000	1000	-	602	1322
1050 (42)	708 (27.9)	N/A	N/A	-	N/A	N/A	1050	-	N/A	N/A
1100 (44)	759 (29.9)	N/A	N/A	-	N/A	N/A	1100	-	N/A	N/A
1200 (48)	814 (32.0)	1200	1500/1200	-	N/A	1200	1200	-	887	1996

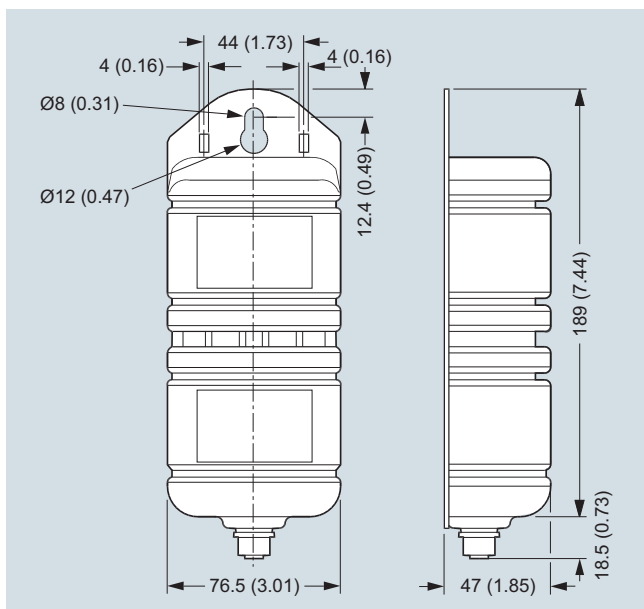
¹⁾ For remote version the sensor weight is reduced with 2 kg (4.5 lb)

Remote version



Dimensions in mm (inch), weight 3.5 kg (8 lb)

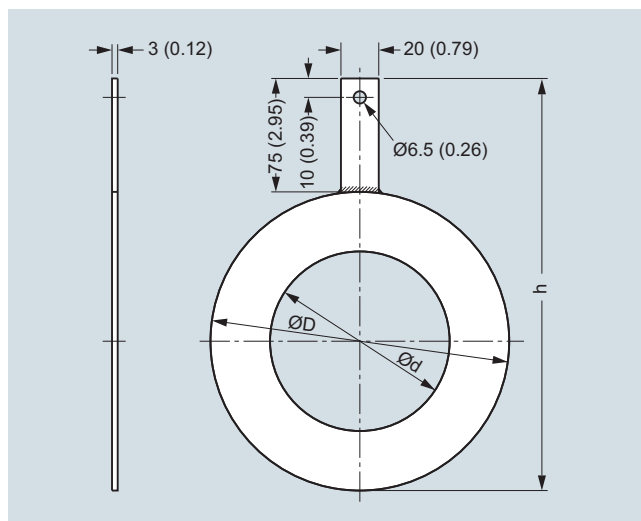
External battery pack



Dimensions in mm (inch), weight 2.0 kg (4.5 lb)

Battery pack has to be mounted in upwards position to ensure maximum battery capacity.

Grounding rings



Dimensions in mm (inch) for grounding rings MAG 8000 with EPDM lining (7ME6810 and 7ME6820) DN 25 to DN 300

Dimension	Internal diameter (d)	Outside diameter (D)	h
DN 25	27	68	143
DN 40	38	88	163
DN 50	52	100	175
DN 65	64	120	195
DN 80	79	133	208
DN 100	95	158	233
DN 125	115	188	263
DN 150	145	216	336
DN 200	193	268	343
DN 250	246	324	399
DN 300	295	374	449

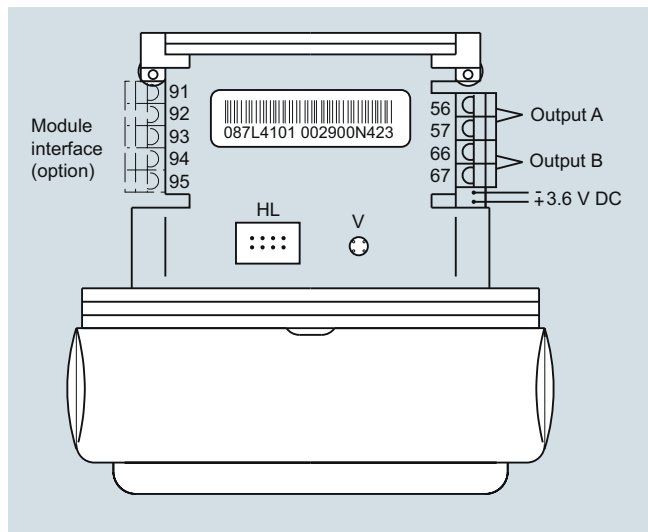
Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

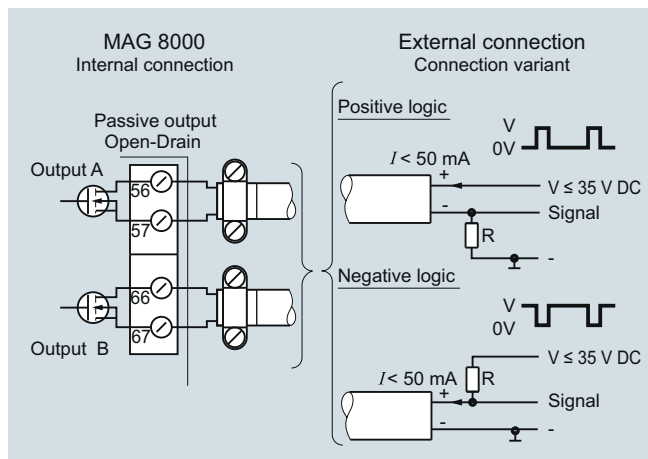
Schematics

Electrical installation and pulse output – Connection diagram



HL = Hardware lock key connection
 V = Push button for verification mode

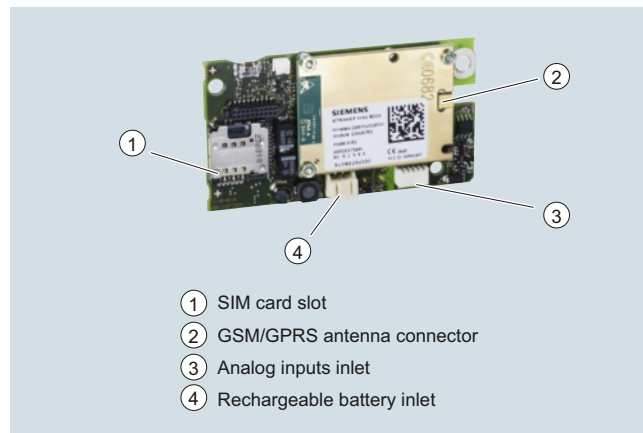
Pulse wire connection



The pulse output can be configured as volume, alarm or call-up. The output can be connected as positive or negative logic. R = pull up/down is selected in relation to the Vx power supply and with a max. current I of 50 mA.




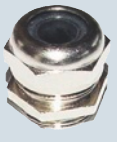



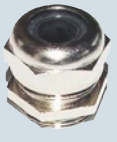

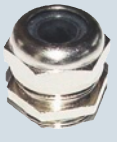








Use shielded cable to avoid EMC problems. Make sure the shield is correctly mounted under the cable clamp (no pig tail).

Electrical installation of GSM/GPRS module



- ① SIM card slot
- ② GSM/GPRS antenna connector
- ③ Analog inputs inlet
- ④ Rechargeable battery inlet


Accessories

Description	Article No.		Description	Article No.	
PC Flow Tool on CD (Download for free from www.siemens.com/flow)	FDK:087L6001		MAG 8000 GSM/GPRS communication module. Rechargeable battery, antenna and analog cable input must be ordered sep- arately	A5E03412758	
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	◆ FDK:087L4163		One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package ²⁾ (1 pc)	◆ FDK:087L4196	
Battery backup for mains power supply, 1 pc. D-cell (3.6 V, 16.5 Ah) ¹⁾	◆ A5E03354392		One cable entry 2 ... 5 mm (0.08 ... 0.20 ") M12 brass glands with M20 reduction ²⁾ . Package of 10 pcs	FDK:087L4154	
Rechargeable Lithium bat- tery for MAG 8000 GSM/GPRS communication module ¹⁾	◆ A5E03436686		One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4155	
Internal battery pack, one set of 2 D-cell (3.6 V, 33 Ah) and accessories for replacement ¹⁾	◆ FDK:087L4150		One cable entry 8 ... 11 mm (0.31 ... 0.43 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4156	
External battery pack IP68/NEMA 6P with connec- tor, 4 D-cell (3.6 V, 66 Ah) ¹⁾ . Order cable FDK:087L4152 separately.	◆ FDK:087L4151		One cable entry 11 ... 15 mm (0.43 ... 0.59 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4157	
Mains power supply 12 ... 24 V AC/DC (average power consumption during line ≤ 0.1 VA) with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included) Temperature range: Fixed laying: -40 ... +90 °C (-40 ... +194 °F) Flexible application: -30 ... +80 °C (-22 ... +176 °F)	FDK:087L4210		Two cable entries 3.5 ... 5 mm (0.14 ... 0.20 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4158	
Mains power supply 115 ... 230 V AC, 50/60 Hz, with battery backup up and 3 m (9.8 ft) power cable for external connection (no bat- tery included)	◆ FDK:087L4211		Two cable entries 5.5 ... 7.5 mm (0.22 ... 0.30 "), M20 brass glands package ²⁾ (10 pcs)	FDK:087L4159	
RS 232 add-on module, point to point communi- cation interface with Modbus RTU protocol	FDK:087L4212		High gain antenna for MAG 8000 GSM/GPRS (PVC, IP68, cable length 5 m (16.4 ft), with SMA male connector (type RG 58) and internal SMA to SMP female cable adapter, and single entry cable gland)	◆ A5E03436689	
RS 485 add-on module, multidrop communication interface with Modbus RTU protocol	FDK:087L4213		Analog input cable for MAG 8000 GSM/GPRS (3 m (9.8 ft) cable with M12 con- nector A-Coding female 5 pins, and two-entry cable gland)	A5E03436698	
Encoder interface module, with "Sensus" protocol for ITRON 200WP and 100W radio	A5E02475650		Potting kit for terminal box of flow sensors for IP68/NEMA 6P	◆ FDK:085U0220	
			MAG 8000 Hardware key to access protected param- eters	◆ FDK:087L4165	
			MAG 8000 demo - training unit pack operating on Alka- line batteries. Transmitter with Flow tool CD, IrDA interface adapter and hard- ware key (No dangerous goods limitations)	FDK:087L4080	

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000


Description	Article No.	
Alkaline battery for MAG 8000 demo transmitter (3 V 13 Ah) (No dangerous goods limitations)	FDK:087L4142	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.




- 1) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.
- 2) For cable connection through MAG 8000 transmitter bottom part.







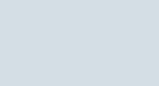
When MAG 8000 (7ME6810 and 7ME6820) is installed in PVC or coated pipelines, grounding rings must be installed additionally.

Grounding rings, type C must be used for the 7ME6810 and 7ME6820 routes (sizes > DN 300). Please see grounding rings in the section MAG 3100 Grounding rings and be aware that the mentioned MLFB codes include only 1 grounding ring. Grounding rings DN 25 to DN 300 in stainless steel are packed in pairs and sold as a "grounding ring kit".

Dimension	Article No.	
DN 25	A5E01002946	
DN 40	A5E01002947	
DN 50	A5E01002948	
DN 65	A5E01002950	
DN 80	A5E01002952	
DN 100	A5E01002953	
DN 125	A5E01002954	
DN 150	A5E01002955	
DN 200	A5E01002957	
DN 250	A5E01002958	
DN 300	A5E01002962	

Spare parts

Description	Article No.	
MAG 8000 transmitter compact replacement kit ¹⁾ . No battery included. System number specified by ordering.	FDK:087L4166	
MAG 8000 transmitter remote replacement kit ¹⁾ . System number specified by ordering.	FDK:087L4202	
MAG 8000 (Advanced version) transmitter compact replacement kit ¹⁾ . No battery included. No system number required.	FDK:087L4203	

Description	Article No.	
MAG 8000 (Advanced version) transmitter remote replacement kit ¹⁾ . No battery included. No system number required.	FDK:087L4204	
MAG 8000 (Basic version) transmitter PCB replacement kit ¹⁾ . No system number required.	A5E01171569	
MAG 8000 (Advanced version) transmitter PCB replacement kit ¹⁾ . No system number required.	FDK:087L4168	
Enclosure top including plastic lid, screws and blank product label	FDK:087L4167	
Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (no battery included); PE jacket, ambient temperature: -20 ... +60 °C (-4 ... +140 °F)	FDK:087L4152	
5 ft. Encoder interface cable with IP68/NEMA 6P plugs included, for ITRON 200WP and 100W radio; 22 AWG stranded TC conductors, polypropylene insulation, twisted pair, overall Beldfoil shield, 22 AWG stranded TC drain wire, PVC jacket	A5E02551263	
25 ft. Encoder interface cable with IP68/NEMA 6P plugs included, for ITRON 200WP radio; 22 AWG stranded TC conductors, polypropylene insulation, twisted pair, overall Beldfoil shield, 22 AWG stranded TC drain wire, PVC jacket	A5E02551182	

Battery-operated water meter MAG 8000

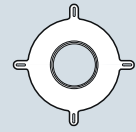
Description	Article No.
Service tool kit package with various component for service and replacement.	FDK:087L4162
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - PG 13.5 ²⁾	FDK:087L4108
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - M20	A5E00862482
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - PG 13.5 ²⁾	FDK:087L4109
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - M20	A5E00862487
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - PG 13.5 ²⁾	FDK:087L4110
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - M20	A5E00862492
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - PG 13.5 ²⁾	FDK:087L4111
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - M20	A5E00862497
10 m cable set with pre-mounted conduit adaptor	A5E33400834
20 m cable set with pre-mounted conduit adaptor	A5E33400836

¹⁾ Not applicable to Custody Transfer (CT) verified systems without re-verification

²⁾ For sensors produced before October 2007.

MAG 8000 (7ME6880) grounding ring service kit, consisting of 2 pcs. grounding rings, screws and gaskets

Dimension	Article No.
Drilled pattern flanges (7 bar)	
DN 50 2"	A5E03082907
DN 65 2½"	A5E03082908
DN 80 3"	A5E03082909
DN 100 4"	A5E03082910
DN 125 5"	A5E03082911
DN 150 6"	A5E32877967
DN 200 8"	A5E03082913
DN 250 10"	A5E03082914
DN 300 12"	A5E03082915
DN 350 14"	A5E03082916
DN 400 16"	A5E03082917
DN 450 18"	A5E03082918
DN 500 20"	A5E03082919
DN 600 24"	A5E03082920
AS 2191 table E flanges	
DN 25 1"	A5E33474999
DN 40 1½"	A5E33475000
DN 125 5"	A5E33475006
AS 4087 PN 16 flanges	
DN 50 2"	A5E33475001
DN 65 2½"	A5E33475002
DN 80 3"	A5E33475003
DN 100 4"	A5E33475004
DN 150 6"	A5E33475007
DN 200 8"	A5E33475008
DN 250 10"	A5E33475009
DN 300 12"	A5E33475010
DN 350 14"	A5E33475011
DN 400 16"	A5E33475012
DN 450 18"	A5E34240921
DN 500 20"	A5E33475013
DN 600 24"	A5E33475014
DN 700 28"	A5E33414889
DN 800 32"	A5E33414890
DN 900 36"	A5E33414891
DN 1000 40"	A5E33414892
DN 1200 48"	A5E33414893



Flow Measurement

SITRANS F C

System information SITRANS F C

Overview



SITRANS F C Coriolis mass flowmeters are designed for measurement of a variety of liquids and gases. The meter offers accurate measurement of mass flow, volume flow, density, temperature and fraction.

Compatibility between transmitters and sensors

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
FCT030	3/173	Yes	Yes	Yes	FCS400 Standard, DN 15 ... DN 80	3/163
		Yes	Yes	Yes	FCS400 Hygienic, DN 15 ... DN 80	3/163
		Yes	Yes	Yes	FCS400 NAMUR, DN 15 ... DN 80	3/163
FCT010 (only compact - FC410)	3/156	Yes	No	Yes	FCS400 Standard, DN 15 ... DN 80	3/163
		Yes	No	Yes	FCS400 Hygienic, DN 15 ... DN 80	3/163
		Yes	No	Yes	FCS400 NAMUR, DN 15 ... DN 80	3/163
MASS 6000 IP67 Polyamide enclosure	3/180	No	Yes	No	FCS200, DN 10 ... DN 25	3/203
		No	Yes	No	FC300, DN 4	3/212
		No	Yes	No	MASS 2100, DI 1.5	3/208
		Yes	Yes	No	MASS 2100, DI 3 ... DI 40	3/217
		No	Yes	No	MASS MC2, DN 100...DN 150	3/228
		No	Yes	Yes	MASS MC2 Ex, DN 100...DN 150	3/228
MASS 6000 19"	3/185	No	Yes	No	FCS200, DN 10 ... DN 25	3/203
		No	Yes	No	FC300, DN 4	3/212
		No	Yes	No	MASS 2100, DI 1.5	3/208
		No	Yes	No	MASS 2100, DI 3 ... DI 40	3/217
		No	Yes	No	MASS MC2, DN 100...DN 150	3/228
		No	Yes	Yes	MASS MC2 Ex, DN 100...DN 150	3/228
MASS 6000 Ex 19"	3/185	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/203
		No	Yes	Yes	FC300, DN 4	3/212
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/208
		No	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	3/217
MASS 6000 Ex d Stainless steel enclosure	3/194	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/203
		No	Yes	Yes	FC300, DN 4	3/212
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/208
		Yes	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	3/217
SIFLOW FC070 Standard	3/199	No	Yes	No	all	
SIFLOW FC070 Ex CT	3/199	No	Yes	Yes	all except MC2	

BenefitsGreater flexibility

- Wide product program
- High performance and top-end flowmeters
- Compact or remote installation using the same transmitters and sensors within their flowmeter series

Easier commissioning

All SITRANS F C Coriolis flowmeters feature a sensor related memory unit SENSORPROM or SensorFlash which stores calibration data and transmitter settings for the lifetime of the product.

At commissioning the flowmeter commences measurement without any initial programming.

Easier service

- Comprehensive self-diagnosis and service menu enhances troubleshooting and meter verification.
- Transmitter replacement requires no programming. SENSORPROM automatically updates all settings after initialization.

Room for growth

- FC430:
Digital platform allows for any sensor in the range to be matched in compact or remote. The wide range of sensors are all certified to SIL2 or SIL3 (redundant) with the FCT030 transmitter in compact mode.
- MASS 6000:
USM II the Universal Signal Module with "plug & play" simplicity makes it easy to access and integrate the flowmeter with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.
- SIFLOW:
Direct integration into SIMATIC S7-300 systems as a flowmeter specific I/O module ensures fast and smooth startup, seamless integration, fast operation.

Application

Coriolis flowmeters are generally suitable for measuring liquids and gases. The flow measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install and use. The Coriolis flowmeter is recognized for its high accuracy over a wide turn-down ratio.

The main applications of the Coriolis flowmeter can be found in all industries, such as:

Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis, filling and dosing
Food and beverage	Dairy products, beer, wine, soft-drinks, °Plato/°Brix, fruit juices and pulps, bottling, CO ₂ dosing, CIP-liquids
Automotive	Fuel injection nozzle and pump testing, filling of AC units, engine consumption measurement, paint robots
Oil and gas	Filling of gas bottles, furnace control, CNG-dispensers, test separators, LPG, well-head water-cut monitoring
Water and waste water	Dosing of chemicals for water treatment

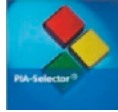
Flow Measurement

SITRANS F C

System information SITRANS F C

Please see Product selector

www.pia-selector.automation.siemens.com on the Internet, since some constraints might be related to some of the features



FC430	FC410	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4611 7ME4621 7ME4711	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

Design

Compact	●	●	●				●		●	
Remote	●		●	●	●	●	●	●	●	●

Transmitter enclosure

Polyamide, IP67/NEMA 6							●			
Noryl (SIMATIC S7-300), IP20/NEMA 2										●
Stainless steel IP67/NEMA 6									●	
19" rack IP20/NEMA 2 aluminum							●			
Back of panel IP20 aluminum							●			
Wall mounting IP65 ABS plastic							●			
Front of panel IP65 ABS plastic							●			
Aluminium IP67	●	●								

Communication

HART	●						●	●	●	
PROFIBUS PA							●	●	●	
PROFIBUS DP							●	●		
Modbus RTU/RS 485		●					●	●		●
Modbus RTU/RS 232										●
FOUNDATION Fieldbus H1							●	●	●	
DeviceNet							●	●		

Supply voltage

24 V DC	●	●								●
24 V AC/DC							●	●	●	
115/230 V AC	●						●	●		

Pipe size

DI 1.5 (1/16")			●							
DI 3 (1/8")				●						
DN 4 (1/6")					●					
DI 6 (1/4")				●						
DN 10 (3/8")						●				
DI 15 (1/2")				●						
DN 15 (1/2")	●	●				●				
DI 25 (1")	●	●		●						
DI 40 (1 1/2")				●						
DN 50 (2")	●	●								
DN 80 (3")	●	●								
DN 100 (4")									●	
DN 150 (6")									●	

Process connection norms and pressure

Pipe thread

NPT ANSI/ASME B.20.1; PN 100	●	●	●	●	●					
NPT ANSI/ASME B.20.1; PN 350							●			
VCO	●	●					●			
ISO 228/1; PN 100	●	●	●	●	●					

● = available

Please see Product selector

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FC430	FC410	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4611 7ME4621 7ME4711	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

Flange

EN 1092-1 PN 40	●	●	●	●	●					
EN 1092-1 PN 100	●	●	●	●	● ¹⁾					
EN 1092-1 PN 160 ⁷⁾	●	●								
ANSI B16.5 Class 150	●	●	●	●	●					
ANSI B16.5 Class 300	●				●					
ANSI B16.5 Class 600	●	●	●	●	● ¹⁾					
ANSI B16.5 Class 900 ⁸⁾	●	●								

Dairy

DIN 11851 PN 25	●	●	●	●	● ¹⁾					
DIN 11851 PN 40	●	●		●						
DIN 11864-1A	●	●								
DIN 11864-2A	●	●								
DIN 11864-3A	●	●								
Clamp ISO 2852 PN 16	●	●	●	●						
ISO 2853 PN 16	●	●		●						
DIN 32676 Tri-Clamp PN 10/PN 16	●				●					
Others on request	●	●	●	●	●	●				

Pipe material

Stainless steel AISI 316L/1.4435	●	●	●	●	●					
Stainless steel AISI 316Ti/1.4571						●				
Hastelloy C22/2.4602	●	●	●	● ⁴⁾	●	● ⁶⁾				
Hastelloy C4/2.4610						●				

With heating jacket

Internal U - tube				●						
External electric jacket	●	●								

Pressure rating

PN 40	●	●		●	●					
PN 100	●	●	●	●	●	● ¹⁾				
PN 160	●	●								
PN 214							●			
PN 350							●			
High-pressure version ²⁾			●	●	●					

Accuracy

Flow error ≤ 0.1 % of rate	●	●	●	●	●					
Flow error ≤ 0.15 % of rate						●				
Flow error ≤ 0.5 % of rate							●			
Density error ≤ 0.0005 g/cm ³					●					
Density error ≤ 0.001 g/cm ³	●	●	●			●				
Density error ≤ 0.0015 g/cm ³				● ³⁾	●					

Cable glands

PG 13.5								● ⁵⁾		
½" NPT	●	●					●			
M20	●	●				●	●		●	

● = available

1) Not available for DN 150 sensor.

2) See technical specifications.

3) DI 3 and DI 6

4) DI 15, DI 25 and DI 40 are not available for Hastelloy C22/2.4602.

5) Only when mounted in enclosure.

6) Process connectors in AISI 316Ti/1.4571

7) Sensor pressure limited to 100 bar (AISI 316L) and 160 bar (Hastelloy C22)

8) Sensor pressure limited to 100 bar (AISI 316L) and 150 bar (Hastelloy C22)

Flow Measurement

SITRANS F C

System information SITRANS F C

Please see Product selector

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FC430	FC410	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4611 7ME4621 7ME4711	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

Approvals

Custody Transfer

Compressed gaseous fuel measuring systems for vehicles - OIML R 139

Other media than water pattern approval - OIML R 117

Hazardous locations

ATEX

IECEX

FM

UL

CSA

NEPSI

INMETRO

Ordinary locations

USL, CNL-Flowmeter c-UL-us

USR, CNR-Flowmeter c-UL-us

PED

Fluid group 1 Category II, Module H PED Directive 97/23/EC

Module B1 + D 0/25 ... 100 bar, -80/200°C, DN 20 ... 150 PED Directive 97/23/EC

CRN

Category F OF10769.5C CRN

Pharma

EHEDG TUM

3A

Note: Special conditions for safe use might be specified in certificates or operating instructions.

● = available

1) Sensor pressure max. 100 bar (1450 psi)

2) Only remote version

3) Can be placed in zone 2 if mounted in minimum IP54 cabinet.

4) Only Ex version

5) 24 V; IP20

6) 115 ... 230 V; IP20

7) 115 ... 230 V; IP65

8) Only DI 25 and DI 40

9) For sizes \geq DN 100 only

10) Install in Div. 2, sensor interface into Div. 1, only Ex CT version

11) Only DI 6 is CRN

Function

The flow measuring principle is based on the Coriolis effect. The flowmeter consists of a system FC410 or FC430 or a combination of a sensor type MASS 2100/FC300/FCS200/MC2 and a transmitter type MASS 6000/SIFLOW FC070.

The SITRANS F C sensors are energized by an electro-mechanical driver circuit which oscillates the pipe at its resonant frequency.

Two pick-ups, 1 and 2 are placed symmetrically on both sides of the driver. When liquid or gas flows through the sensor, Coriolis force will act on the measuring pipe and cause a pipe deflection which can be measured as a phase shift on pick-up 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated to ensure a stable output from the 2 pick-ups.

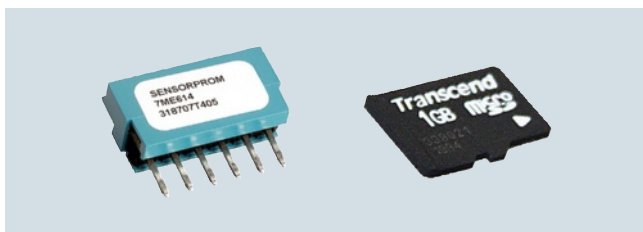
The temperature of the sensor is measured by a Pt1000. For MC2 the temperature is measured with a Pt100.

The flow-proportional signal from the 2 pick-ups, the temperature measurement and the driver frequency are fed into the SITRANS F C transmitter for calculations of mass, volume, fraction, temperature and density.

The signal transfer function is based on a patented DFT technology (Discrete Fourier Transformation).

The transmitter has a built-in noise filter, which can be used to improve the meter's performance if the installation and application conditions are not ideal. Typically influence from process noise such as pump pulsations, mechanical vibrations, oscillating valves can be reduced considerably.

For communication purposes the SITRANS F C MASS 6000 transmitters have a CAN interface with a Siemens specific protocol. This concept is known as the USM II (Universal Signal Module) concept. The idea is that extra output modules or communication modules can be connected to this bus, making it possible to configure the flowmeter for the precise task in hand. When the internal CAN bus detects the installed module, it is automatically programmed to factory settings via the SENSORPROM memory unit, and the new menu is visible in the MASS 6000 display.



SENSORPROM and SensorFlash flow memory units

FC410 flow transmitters communicate via Modbus RTU and FC430 via HART. Currently the USM platform handles all present and future communication protocols, e.g., PROFIBUS DP, PROFIBUS PA, HART, Modbus, FOUNDATION Fieldbus H1 and DeviceNet.

Integration

Installation of MASS 2100/FC300 and MC2 sensors

Installation requirements/System design information

The SITRANS F C mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 6 or IP65. The flowmeter is bidirectional and can be installed in any orientation, however, the sensor is not self-emptying in all positions.

It is important to ensure that the meter tubes are always completely filled with homogeneous fluid. Otherwise measuring errors may occur.

The corrosion resistance of the fluid-wetted materials must be evaluated.

The pressure drop through the sensor is a function of the properties of the fluid and the flow rate. The **Sizing Program** (download from <https://pia.khe.siemens.com/index.aspx?nr=11501>) can be used to calculate the pressure drop.

The preferred flow direction is indicated by the arrow on the flowmeter. Flow in this direction will be indicated as positive.

Installation orientation

- FCS400 – sensors
The optimal installation orientation is vertical with flow upwards (liquids) and up to 10° off vertical for self-draining.
- MASS 2100/FC300 – sensors
The optimal installation orientation is horizontal.
- MC2 – sensors
The optimal installation orientation is vertical with the flow upwards.

Supports

- In order to support the weight of the flowmeter and to ensure reliable measurements when external effects exist (e.g. vibrations), the sensor should be installed in well-supported pipelines. Supports or hangers should be installed symmetrically and stress-free in close proximity to the process connections. FCS400 sensors can be supported at the junction between the process connection and the main body of the sensor.

Shut-off devices

- To conduct a system zero adjustment, shut-off devices are required in the pipeline.
 - In horizontal installations at the outlet for FC300 and MC2 and the inlet for MASS 2100.
 - In vertical installations at the inlet.
- When possible, shut-off devices should be installed both up- and downstream of the flowmeter. A bypass valve is recommended where regular zero adjustment is planned to avoid disruption of the flowing system.

Installation: straight run requirements

- The mass flowmeter does not require any flow condition or straight inlet sections. Care should be exercised to ensure that any valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flowmeter.

System design information

- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the highest point in the system where bubbles are possibly largest.
- Long drop lines downstream from the flowmeter should be avoided to prevent the meter tube from draining during operation.
- The flowmeter should not come into contact with any other objects. Avoid attachments to the housing.
- When the cross-section of the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section and outside the section between the shut-off devices.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.2 bar (3 psi).
- Assure that operation below the vapor pressure cannot occur when a vacuum exists in the meter tube or for fluids which boil readily.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, transformers etc.

Flow Measurement

SITRANS F C

System information SITRANS F C

- When operating more than one meter in one or multiple inter-connected pipelines, the sensors should be spaced distant from each other or the pipelines should be decoupled to prevent cross talk.

Zero adjustment

- In order to adjust the zero under operating conditions it must be possible to reduce the flow rate to „ZERO“ while the meter tube is completely filled. It is important for accurate measurements that during the zero adjustment there are no gas bubbles in the flowmeter. It is also important that the pressure and temperature in the meter tube be the same as that which exists during operation.

Technical specifications

Flowmeter uncertainty/specifications

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities accredited according to ISO/IEC 17025 by DANAK.

The accreditation body DANAK has signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit. FC410 and FC430 meters have the calibration data written to the front end section. A backup of all calibrations and PDF copies of all certificates are stored in the SensorFlash.

FCS400 sensors and FCT030/FCT010 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 15 (½")	185	(408)	1 850	(4 079)	3 700	(8 157)
DN 25 (1")	575	(1 268)	5 750	(12 677)	11 500	(25 353)
DN 50 (2")	2 600	(5 732)	26 000	(57 320)	52 000	(114 640)
DN 80 (3")	6 800	(15 000)	68 000	(150 000)	136 000	(300 000)

MASS 2100 sensors and MASS 6000 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DI 1.5 (1/16")	1.5	(3.3)	15	(33)	30	(66)
DI 3 (1/8")	12	(26)	125	(275)	250	(550)
DI 4 (1/6")	17.5	(38)	175	(386)	350	(770)
DI 6 (¼")	50	(110)	500	(1 102)	1 000	(2 200)
DI 15 (½")	280	(617)	2 800	(6 173)	5 600	(12 345)
DI 25 (1")	1 250	(2 756)	12 500	(27 558)	25 000	(55 100)
DI 40 (1½")	2 600	(5 732)	26 000	(57 320)	52 000	(114 600)

MC2 sensors and MASS 6000 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 100 (4")	7 100	(15 653)	71 000	(156 528)	142 000	(313 056)
DN 150 (6")	21 050	(46 407)	210 500	(464 073)	421 000	(928 145)

- Q_{max} (100%) is calibrated with water at:
 - FCS400 sensors: a pressure drop of 1 bar (14.5 psi)
 - MASS 2100 sensors (all except Di 1.5): a flow speed of 10 m/s (Di 1.5: a flow speed of 4.7 m/s)
 - MC2 sensors: a pressure drop of 2 bar (29 psi).
- For flow > 5 % of the sensors max. flow rate, the error can be read directly from the curve below.
- For flow < 5 % of the sensors max. flow rate, use the formula to calculate the error.
- The error curve is plotted from the formula:

$$E = \pm \sqrt{(\text{Cal.})^2 + \left(\frac{z \times 100}{q_m}\right)^2}$$

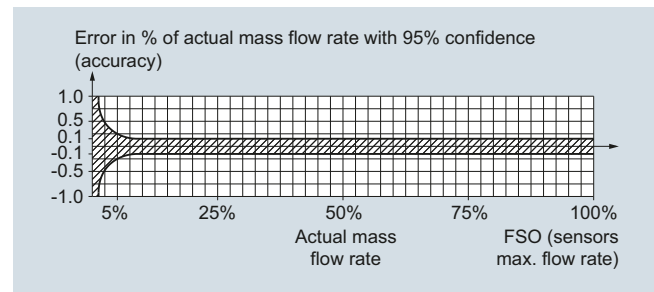
E = Error [%]

Z = Zero point error [kg/h]¹⁾

qm = Mass flow [kg/h]

Cal. = Calibrated flow accuracy: 0.10 or 0.15

¹⁾ Zero point error for each sensor is shown in the tables below.



Reference conditions for flow calibrations (ISO 9104 and DIN/EN 29104)

Flow conditions	Fully developed flow profile
Temperature, medium	20 °C ± 2 °C (68 °F ± 3.6 °F)
Temperature, ambient	20 °C ± 2 °C (68 °F ± 3.6 °F)
Liquid pressure	2 ± 1 bar
Density	0.997 g/cm ³
Brix	40 °Brix
Supply voltage	U _n ± 1 %
Warming-up time	30 min.
Cable length	5 m between transmitter and sensor

Additions in the event of deviations from reference conditions

Current output	As pulse output ± (0.1% of actual flow + 0.05 % FSO)
Effect of ambient temperature	<ul style="list-style-type: none"> Display/frequency/pulse output: < ± 0.003%/K act. Current output: < ± 0.005 %/K act.
Effect of supply voltage	< 0.005 % of measuring value on 1 % alteration

Sensor type		FC300	MASS 2100					
Sensor size		DN 4 (1/6")	DI 1.5 (1/16")	DI 3 (1/8")	DI 6 (1/4")	DI 15 (1/2")	DI 25 (1")	DI 40 (1 1/2")
Number of measuring pipes		1	1	1	1	1	1	1
Mass flow								
Linearity error	% of rate	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Repeatability error	% of rate	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.010	0.001	0.010	0.050	0.200	1.500	6.000
Density								
Density error ¹⁾	[g/cm ³]	0.0025 ²⁾	0.001	0.0015	0.0015	0.0005	0.0005	0.0005
Repeatability error	[g/cm ³]	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Range	[g/cm ³]	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9
Temperature								
Error	[°C (°F)]	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)
Brix								
Error	[°Brix]	0.3	0.2	0.3	0.3	0.1	0.1	0.1

¹⁾ Accuracy is only valid when sensor is density-calibrated.

²⁾ Hastelloy C22 version.

Sensor type		FCS400				MC2	
Sensor size		DN 15 (1/2")	DN 25 (1")	DN 50 (2")	DN 80 (3")	DN 100 (4")	DN 150 (6")
Number of measuring pipes		2	2	2	2	2	2
Mass flow:							
Linearity error	% of rate	0.1	0.1	0.1	0.1	0.15	0.15
Reproducibility of flowrate at rates > 5 % of Q _{max}	% of rate	0.05	0.05	0.05	0.05	0.1	0.1
Max. zero point error	[kg/h (lb/h)]	0.2 (0.44)	2 (4.41)	7.5 (16.5)	18.0 (39.7)	24.96 (55.03)	330 (727.53)
Density							
Density error	(Standard) [g/cm ³]	0.005	0.005	0.005	0.005	0.005	0.005
	(Extended) [g/cm ³]	0.001	0.001	0.001	0.001	0.001	Not available
Range	[kg/dm ³]	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.5 ... 3.5	0.5 ... 3.5
Repeatability error	[g/l]	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Temperature							
Error	[°C (°F)]	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	1.0 (1.8)	1.0 (1.8)
Brix¹⁾							
Error	[°Brix]	0.1	0.1	0.1	0.1	On request ¹⁾	Not available

¹⁾ Flow and density calibration (1 kg/m³) required. Brix/Plato and Fraction available as PVR.

Flow Measurement

SITRANS F C

System information SITRANS F C

Technical specifications PROFIBUS PA/DP

General specifications

PROFIBUS device profile	3.00 Class B
Certified	Yes, according to Profile for process control devices V3.00.
MS0 connections	1
MS1 connections	1
MS2 connections	2

Electrical specification DP

Physical layer specifications

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	RS 485
Transmission speed	≤ 1.5 Mbit/s
Number of stations	Up to 32 per line segment, (maximum total of 126)

Cable specification (Type A)

Cable design	Two wire twisted pair
Shielding	CU shielding braid or shielding braid and shielding foil
Impedance	35 up to 165 Ω at frequencies from 3 ... 20 MHz
Cable capacity	< 30 pF per meter
Core diameter	> 0.34 mm ² , corresponds to AWG 22
Resistance	< 110 Ω per km
Signal attenuation	Max. 9 dB over total length of line section
Max. bus length	200 m at 1500 kbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA

Physical layer specifications

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	IEC-61158-2
Transmission speed	31.25 kbit/s
Number of stations	Up to 32 per line segment, maximum total of 126)
Max. basic current [I _B]	14 mA
Fault current [I _{FDE}]	0 mA
Bus voltage	9 ... 32 V (non Ex)

Preferred cable specification (Type A)

Cable design	Two wire twisted pair
Conductor area (nominal)	0.8 mm ² (AWG 18)
Loop resistance	44 Ω/km
Impedance	100 Ω ± 20 %
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line terminated at both ends
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data

Required sensor electronics	Compact mounted SITRANS F C MASS 6000 Ex d
FISCO	Yes
Max. U _I	17.5 V
Max. I _I	380 mA
Max. P _I	5.32 V
Max. L _I	10 μH
Max. C _I	5 nF
Max. U _o	1.3 V
Max. I _o	50 μA

FISCO cable requirements

Loop resistance R _C	15 ... 150 Ω/km
Loop inductance L _C	0.4 ... 1 mH/km
Capacitance C _C	80 ... 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a MS0 relationship from a Class 1 Master. MS0 specifies cyclic Data Exchange between a Master and a Slave.

Cyclic services:

Input (Master view)	Parameter	MASS 6000
	Mass flow	✓
	Volume flow	✓
	Temperature	✓
	Density	✓
	Fraction A ¹⁾	✓
	Fraction B ¹⁾	✓
	Pct Fraction A ¹⁾	✓
	Totalizer 1	✓
	Totalizer 2 ²⁾	✓
	Batch progress ²⁾	✓
	Batch setpoint	✓
	Batch compensation	✓
	Batch status (running ...)	✓
Output (Master view)	Set Totalizer 1+2	✓
	Set Mode Totalizer 1+2	✓
	Batch control (start, stop ...)	✓
	Batch setpoint	✓
	Batch compensation	✓

¹⁾ Requires a SENSORPROM containing valid fraction data.

²⁾ Value returned is dependent on the BATCH function.

When **ON**, Batch progress is returned.

When **OFF**, TOTALIZER 2 is returned.

Overview



The complete flowmeter system SITRANS FC430 can be ordered for standard, hygienic or NAMUR service. All versions can be ordered for CT service, according to OIML R 117 (Liquids other than water).

SIL specified compact variants can be validated and configured for SIL 2 or SIL 3 operation. SIL 3 operation requires two flowmeters in series and monitored by a SIL-rated control system. Series mounting must not introduce cross-talk between the sensors. Refer to installation guidelines.

The flowmeter is based on the latest developments within digital signal processing technology – engineered for high measuring performance:

- Fast response to rapid changes in flow
- Fast dosing applications
- High immunity against process noise
- High turndown ratio of flowrates
- Suitable for liquid and gas service
- Easy to install, commission and maintain

FC430 is available as standard with 4 to 20 mA analog output with HART 7.2. Additional functions can be freely configured for analog, pulse, frequency, relay or status output or binary input.

The transmitter comes with a user-configurable graphical display and SensorFlash, a micro SD card for configuration backup, firmware update and data storage.

The SITRANS FC430 flowmeter system consists of a SITRANS FCS400 sensor and a SITRANS FCT030 transmitter.

Benefits

- It is narrow and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Highly secure operation in safety critical applications
- Non-volatile memory of all setup and operation data
- Reliable measurements due to high signal to noise ratio
- Secure, digital transfer of measurement data from the sensor
- Short overall length; easy drop-in replacement into most existing installations
- Functional Safety (SIL X). Device suitable for use in accordance with IEC 61508 and IEC 61511.

Technical specifications

Sizes	DN 15 (½"), DN 25 (1"), DN 50 (2"), DN 80 (3")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (water @ 1 bar pressure loss)	DN 15: 3 700 kg/h (8 157 lb/h) DN 25: 11 500 kg/h (25 353 lb/h) DN 50: 52 000 kg/h (114 640 lb/h) DN 80: 136 000 kg/h (300 000 lb/h)
Architecture	Compact or remote configuration with selection of twelve languages including Chinese and Russian
Display	Full graphical display, 240 x 160 pixels
Power supply	24 ... 90 V DC ± 10 %; 100 ... 240 V AC ± 10 %, 50 ... 60 Hz ± 10 %
Weight	4.6 ... 50 kg
Material	<ul style="list-style-type: none"> • Sensor <ul style="list-style-type: none"> - Wetted parts: 316L stainless steel or Hastelloy C22 - Enclosure: 304 stainless steel • Transmitter: Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	<ul style="list-style-type: none"> • Measuring tubes <ul style="list-style-type: none"> - 316L: 100 bar (1450 psi) - Hastelloy C22: 160 bar (2321 psi) • Sensor enclosure: 20 bar (DN15, DN 25) 17 bar (DN 50, DN 80) • Sensor enclosure burst pressure: >160 bar (all sizes)
Temperature ratings	<ul style="list-style-type: none"> • Process medium: -50 ... +200 °C (-58 ... +392 °F) • Ambient: -40 ... +60 °C (-40 ... +140 °F) • Display: -20 ... +60 °C (-4 ... +140 °F)
Process connections	<ul style="list-style-type: none"> • Flanges: EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2 • Pipe threads: ASME B1.20 (NPT), ISO228-1 G (BSPP), VCO Quick-connect • Hygienic threads: DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 • Hygienic clamps: DIN 11864-3A, DIN 32676, ISO 2852
Approvals	<ul style="list-style-type: none"> • Hazardous area: ATEX, IECEx, FM, NEPSI, CSA, INMETRO • Pressure equipment: PED, CRN • Hygienic: 3A, EHEDG • Custody transfer: OIML R 117 • Operational safety (compact system only): SIL 2 Single SIL 3 Redundant system
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	HART 7.2
EMC performance	EN 61326-3-2
Mechanical load	18 to 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME 4 6 1 3 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor size, connection size		
DN 15, DN 10 (½", 3/8")	3 F	
DN 15, DN 15 (½", ½")	3 G	
DN 15, DN 20 (½", ¾")	3 H	
DN 15, DN 25 (½", 1")	3 J	
DN 25, DN 15 (1", ½")	3 K	
DN 25, DN 25 (1", 1")	3 L	
DN 25, DN 40 (1", 1½")	3 N	
DN 50, DN 40 (2", 1½")	4 B	
DN 50, DN 50 (2", 2")	4 C	
DN 80, DN 65 (3", 2½")	4 J	
DN 80, DN 80 (3", 3")	4 K	
DN 80, DN 100 (3", 4")	4 L	
Process connection		
EN 1092-1 B1, PN 16	A 0	
EN 1092-1 B1, PN 40	A 1	
EN 1092-1 B1, PN 63	A 2	
EN 1092-1 B1, PN 100	A 3	
EN 1092-1 B1, PN 160	B 1	
EN 1092-1 D NUT, PN 40	A 5	
EN 1092-1 D NUT, PN 63	A 6	
EN 1092-1 D NUT, PN 100	A 7	
EN 1092-1 D NUT, PN 160	A 8	
ANSI B16.5-2009, class 150	D 1	
ANSI B16.5-2009, class 300	D 2	
ANSI B16.5-2009, class 600	D 3	
ANSI B16.5-2009, class 900	D 4	
ISO228-1 G pipe thread	E 1	
ASME B1.20.1 NPT pipe thread	E 3	
DIN 11851 hygienic screwed	F 1	
DIN 32676 hygienic Tri-Clamp	G 1	
DIN 11864-1A aseptic screwed	H 1	
DIN 11864-2A aseptic flanged	H 2	
DIN 11864-3A clamped	H 3	
ISO 2852 hygienic clamped	J 1	
ISO 2853 hygienic screwed	J 5	
SMS 1145 hygienic screwed	K 1	
12-VCO-4 quick connect	K 5	
JIS B2200:2004/10K	L 2	
JIS B2220:2004/20K	L 4	
JIS B2220:2004/40K	L 6	
JIS B2220:2004/63K	L 7	
Wetted parts material		
AISI 316L/W1.4435/W1.4404 (100 barg max.)	1	
Hastelloy C22 (only for 7ME461)	3	
Calibration/Accuracy class		
0.1 % flow, 5 kg/m³ density	1	
0.1 % flow, 1 kg/m³ density	4	
Standard fraction calibration	8	
Transmitter/DSL material & mounting style		
Compact, IP67, aluminum	D	
Remote, IP67, aluminum, M12	G	
Remote, IP67, aluminum, T/Box	K	

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME 4 6 1 3 -	
Ex approval		
Non-Ex	◆	A
ATEX II 2GD	◆	C
IECEx GDb	◆	F
FM, Class 1, Div 1	◆	H
CSA, Class 1, Zone 1		M
Local User Interface		
Blind	◆	1
Graphical, 240 x 160 pxl	◆	3
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.		

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	◆ A01
Metric, plastic	◆ A02
Metric, brass/Ni plated	A05
Metric, stainless steel	A06
NPT, no glands	A11
NPT, Plastic	A12
NPT, brass/Ni plated	A15
NPT, stainless steel	A16
Software functions and CT approvals	
Standard	◆ B11
CT standard	B31
I/O configuration Ch1	
Ca 4 ... 20 mA HART active SIL certified	◆ E04
Cp 4 ... 20 mA HART passive SIL certified	◆ E05
Ca 4 ... 20 mA HART active	◆ E06
Cp 4 ... 20 mA HART passive	◆ E07
Only compact versions can be used in SIL applications.	

Selection and Ordering data	Order code	Selection and Ordering data	Order code
I/O configuration Ch2, Ch3 and Ch4		Add-on options and accessories	
None	◆ F00	Please add "-Z" to Article No. and specify Order code(s).	
aSignal, None, None	F40	Certificates	
aSignal, aSignal, None	F41	Pressure test certificate CRN	C01
aSignal, aSignal, aSignal	F42	Pressure test certificate PED	C02
aSignal, aSignal, Ia	F43	Material certificate EN 10204-3.1	C05
aSignal, aSignal, R	F44	Welding inspection report	C07
aSignal, Ia, None	F45	Factory certificate to EN 10204 2.1	◆ C10
aSignal, Ia, Ia	F46	Factory certificate to EN 10204 2.2	C11
aSignal, Ia, R	F47	Cable	
aSignal, R, None	F50	None	L50
aSignal, R, R	F51	5 m (16.4 ft), standard with M12 plugs fitted	L51
pSignal, None, None	F60	5 m (16.4 ft), standard	L52
pSignal, pSignal, None	F61	10 m (32.8 ft) standard with M12 plugs fitted	L55
pSignal, pSignal, pSignal	F62	10 m (32.8 ft), standard	L56
pSignal, pSignal, Ip	F63	25 m (82 ft), standard with M12 plugs fitted	L59
pSignal, pSignal, R	F64	25 m (82 ft), standard	L60
pSignal, Ip, None	F65	50 m (164 ft), standard with M12 plugs fitted	L63
pSignal, Ip, Ip	F66	50 m (164 ft), standard	L64
pSignal, Ip, R	F67	75 m (246 ft), standard with M12 plugs fitted	L67
pSignal, R, None	F70	75 m (246 ft), standard	L68
pSignal, R, R	F71	150 m (492 ft), standard with M12 plugs fitted	L71
aSignal, aSignal, pSignal	F80	150 m (492 ft), standard	L72
aSignal, aSignal, Ip	F81	Additional data	
aSignal, pSignal, None	F82	Please add "-Z" to Article No. and specify Order code(s) and plain text.	
aSignal, pSignal, pSignal	F83	Tag name	
aSignal, pSignal, Ia	F84	Tag name plate, stainless steel	Y17
aSignal, pSignal, Ip	F85	◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	
aSignal, pSignal, R	F86	Operating instructions for SITRANS FC430	
aSignal, Ia, Ip	F87	Description	Article No.
aSignal, Ip, None	F90	• English	A5E03361511
aSignal, Ip, Ip	F91	• German	A5E03651143
aSignal, Ip, R	F92	• Spanish	A5E03651152
pSignal, pSignal, Ia	F93	• French	A5E03651188
pSignal, Ia, None	F94	• Italian	A5E03651190
pSignal, Ia, Ia	F95	• Chinese	A5E03922773
pSignal, Ia, Ip	F96	This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.	
pSignal, Ia, R	F97	All literature is also available for free at: http://www.siemens.com/flowdocumentation	
Notes on I/O configurations:			
a or p suffix: The I/O module is selected at ordering with either active or passive function.			
Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu.			
I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.			
R: Relay output for discrete status reporting. Function is selected in the menu, including 'Error', 'High flow warning'.			
The MLFB structure for FC430 systems must be filled to this level , including "-Z" options A., B., E.. and F..			

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter	7ME 4 6 2 3 -	
with SITRANS FCS400 Flow sensor		
Hygienic version with Ra < 0.8 µm, 3A approved, and compact or remote mounting with FCT030 transmitter		
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor size, connection size		
DN 15, DN 10 (½", 3/8")	3 F	
DN 15, DN 15 (½", ½")	3 G	
DN 15, DN 20 (½", ¾")	3 H	
DN 15, DN 25 (½", 1")	3 J	
DN 25, DN 25 (1", 1")	3 L	
DN 25, DN 32 (1", 1¼")	3 M	
DN 25, DN 40 (1", 1½")	3 N	
DN 50, DN 40 (2", 1½")	4 B	
DN 50, DN 50 (2", 2")	4 C	
DN 80, DN 65 (3", 2½")	4 J	
DN 80, DN 80 (3", 3")	4 K	
Process connection		
DIN 11851 0.8 µm hygienic screwed	F 1	
DIN 32676 0.8 µm hygienic Tri-Clamp	G 1	
DIN 11864-1 0.8 µm hygienic screwed	H 1	
DIN 11864-2A BF-A 0.8 µm hygienic screwed (metric)	H 2	
DIN 11864-3A BF-A 0.8 µm hygienic clamped	H 3	
DIN 11864-2B BF-A 0.8 µm hygienic flanged (NPS)	H 4	
ISO 2852 0.8 µm hygienic clamped	J 1	
ISO 2853 0.8 µm hygienic screwed	J 5	
Wetted parts material		
AISI 316L/1.4435 (40 bar max.)	1	
Calibration/Accuracy class		
0.1 % flow, 5 kg/m³ density	1	
0.1 % flow, 1 kg/m³ density	4	
Standard fraction calibration	8	
Transmitter/DSL material and mounting style		
Compact, IP67, aluminum	D	
Remote, IP67, aluminum, M12	G	
Remote, IP67, aluminum, T/Box	K	
Ex approval		
Non-Ex	A	
ATEX II 2GD	C	
IECEX GDb	F	
FM, Class 1, Div 1	H	
CSA, Class 1, Zone 1	M	
Local User Interface		
Blind	1	
Graphical, 240 x 160 pxl	3	

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ⚡. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	⚡ A01
Metric, plastic	⚡ A02
Metric, brass/Ni plated	A05
Metric, stainless steel	⚡ A06
NPT, no glands	A11
NPT, plastic	A12
NPT, brass/Ni plated	A15
NPT, stainless steel	A16
Software functions and CT approvals	
Standard	⚡ B11
CT standard	B31
I/O configuration Ch1	
Ca 4 ... 20 mA HART active SIL certified	⚡ E04
Cp 4 ... 20 mA HART passive SIL certified	⚡ E05
Ca 4 ... 20 mA HART active	⚡ E06
Cp 4 ... 20 mA HART passive	⚡ E07

Selection and Ordering data Order code**I/O configuration Ch2, Ch3 and Ch4**

None	◆ F00
aSignal, None, None	F40
aSignal, aSignal, None	F41
aSignal, aSignal, aSignal	F42
aSignal, aSignal, Ia	F43
aSignal, aSignal, R	F44
aSignal, Ia, None	F45
aSignal, Ia, Ia	F46
aSignal, Ia, R	F47
aSignal, R, None	F50
aSignal, R, R	F51
pSignal, None, None	F60
pSignal, pSignal, None	F61
pSignal, pSignal, pSignal	F62
pSignal, pSignal, Ip	F63
pSignal, pSignal, R	F64
pSignal, Ip, None	F65
pSignal, Ip, Ip	F66
pSignal, Ip, R	F67
pSignal, R, None	F70
pSignal, R, R	F71
aSignal, aSignal, pSignal	F80
aSignal, aSignal, Ip	F81
aSignal, pSignal, None	F82
aSignal, pSignal, pSignal	F83
aSignal, pSignal, Ia	F84
aSignal, pSignal, Ip	F85
aSignal, pSignal, R	F86
aSignal, Ia, Ip	F87
aSignal, Ip, None	F90
aSignal, Ip, Ip	F91
aSignal, Ip, R	F92
pSignal, pSignal, Ia	F93
pSignal, Ia, None	F94
pSignal, Ia, Ia	F95
pSignal, Ia, Ip	F96
pSignal, Ia, R	F97

Notes on I/O configurations:

a or p suffix: The I/O module is selected at ordering with either active or passive function.

Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu.

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

R: Relay output for discrete status reporting. Function is selected in the menu, including 'Error', 'High flow warning'.

The MLFB structure for FC430 systems must be filled to **this level**, including **"-Z"** options A., B., E.. and F..

Selection and Ordering data Order code**Add-on options and accessories**

Please add **"-Z"** to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	◆ C10
Factory certificate to EN 10204 2.2	C11

Cable

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

Please add **"-Z"** to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel	Y17
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◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME 4 7 1 3 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor size, Connection size		
DN 15, DN 6 (½", ¼")	3 E	
DN 15, DN 10 (½", 3/8")	3 F	
DN 15, DN 15 (½", ½")	3 G	
DN 15, DN 20 (½", ¾")	3 H	
DN 15, DN 25 (½", 1")	3 J	
DN 25, DN 25 (1", 1")	3 L	
DN 25, DN 32 (1", 1¼")	3 M	
DN 25, DN 40 (1", 1½")	3 N	
DN 50, DN 40 (2", 1½")	4 B	
DN 50, DN 50 (2", 2")	4 C	
DN 80, DN 65 (3", 2½")	4 J	
DN 80, DN 80 (3", 3")	4 K	
DN 80, DN 100 (3", 4")	4 L	
Process connection		
EN 1092-1 B1, PN 16	A 0	
EN 1092-1 B1, PN 40	A 1	
EN 1092-1 B1, PN 63	A 2	
EN 1092-1 B1, PN 100	A 3	
EN 1092-1 B1, PN 160	B 1	
EN 1092-1 D, PN 40	A 5	
EN 1092-1 D, PN 63	A 6	
EN 1092-1 D, PN 100	A 7	
EN 1092-1 D, PN 160	A 8	
ANSI B16.5, RF, class 150	D 1	
ANSI B16.5, RF, class 300	D 2	
ANSI B16.5, RF, class 600	D 3	
ANSI B16.5, RF, class 900	D 4	
ISO228-1 G pipe thread	E 1	
ASME B1.20.1 NPT pipe thread	E 3	
DIN 11851 Hygienic screwed	F 1	
DIN 32676-C (inch) Hygienic clamped	G 1	
DIN 11864-1 Hygienic screwed	H 1	
DIN 11864-2A BF-A Hygienic flanged metric	H 2	
DIN 11864-3A Hygienic clamped	H 3	
DIN 11864-2B BF-A Hygienic flanged NPS	H 4	
ISO 2852 Hygienic clamped	J 1	
ISO 2853 Hygienic screwed	J 5	
SMS 1145 Hygienic screwed	K 1	
Swagelok Quick Connect	K 5	
JIS B2200/10K	L 2	
JIS B2200/20K	L 4	
JIS B2200/40K	L 6	
JIS B2200/63K	L 7	
Wetted parts material		
AISI 316L/W1.4435/W1.4404 (100 barg max.)	1	
Calibration/Accuracy class		
0.1 % flow, 5 kg/m³ density	1	
0.1 % flow, 1 kg/m³ density	4	
Standard fraction calibration	8	
Transmitter/DSL material & mounting style		
Compact, IP67, aluminum	D	
Remote, IP67, aluminum, M12	G	
Remote, IP67, aluminum, T/Box	K	

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME 4 7 1 3 -	
Ex approval		
Non-Ex		A
ATEX II 2GD		C
IECEx GDb		F
FM, Class 1, Div 1		H
CSA, Class 1, Zone 1		M
Local User Interface		
Blind		1
Graphical, 240 x 160 pxl		3

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	A01
Metric, plastic	A02
Metric, brass/Ni plated	A05
Metric, stainless steel	A06
NPT, no glands	A11
NPT, plastic	A12
NPT, brass/Ni plated	A15
NPT, stainless steel	A16
Software functions and CT approvals	
Standard	B11
CT standard	B31
I/O configuration Ch1	
Ca 4 ... 20 mA HART active, SIL certified	E04
Cp 4 ... 20 mA HART passive, SIL certified	E05
Ca 4 ... 20 mA HART active	E06
Cp 4 ... 20 mA HART passive	E07

Selection and Ordering data

Order code

I/O configuration Ch2, Ch3 and Ch4

None

aSignal, None, None

aSignal, aSignal, None

aSignal, aSignal, aSignal

aSignal, aSignal, Ia

aSignal, aSignal, R

aSignal, Ia, None

aSignal, Ia, Ia

aSignal, Ia, R

aSignal, R, None

aSignal, R, R

pSignal, None, None

pSignal, pSignal, None

pSignal, pSignal, pSignal

pSignal, pSignal, Ip

pSignal, pSignal, R

pSignal, Ip, None

pSignal, Ip, Ip

pSignal, Ip, R

pSignal, R, None

pSignal, R, R

aSignal, aSignal, pSignal

aSignal, aSignal, Ip

aSignal, pSignal, None

aSignal, pSignal, pSignal

aSignal, pSignal, Ia

aSignal, pSignal, Ip

aSignal, pSignal, R

aSignal, Ia, Ip

aSignal, Ip, None

aSignal, Ip, Ip

aSignal, Ip, R

pSignal, pSignal, Ia

pSignal, Ia, None

pSignal, Ia, Ia

pSignal, Ia, Ip

pSignal, Ia, R

◆ **F00**

F40

F41

F42

F43

F44

F45

F46

F47

F50

F51

F60

F61

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F97

Notes on I/O configurations:

a or p suffix: The I/O module is selected at ordering with either active or passive function.

Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu.

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

R: Relay output for discrete status reporting. Function is selected in the menu, including 'Error', 'High flow warning'.

The MLFB structure for FC430 systems must be filled to **this level**, including "-Z" options A..., B..., E... and F...

Selection and Ordering data

Order code

Add-on options and accessories

Please add "-Z" to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN **C01**

Pressure test certificate PED **C02**

Material certificate EN 10204-3.1 **C05**

Welding inspection report **C07**

Factory certificate to EN 10204 2.1 ◆ **C10**

Factory certificate to EN 10204 2.2 **C11**

Cable

None **L50**

5 m (16.4 ft), standard with M12 plugs fitted **L51**

5 m (16.4 ft), standard **L52**

10 m (32.8 ft) standard with M12 plugs fitted **L55**

10 m (32.8 ft), standard **L56**

25 m (82 ft), standard with M12 plugs fitted **L59**

25 m (82 ft), standard **L60**

50 m (164 ft), standard with M12 plugs fitted **L63**

50 m (164 ft), standard **L64**

75 m (246 ft), standard with M12 plugs fitted **L67**

75 m (246 ft), standard **L68**

150 m (492 ft), standard with M12 plugs fitted **L71**

150 m (492 ft), standard **L72**

Additional data

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel **Y17**

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Overview



The compact flowmeter SITRANS FC410 can be ordered for industrial, hygienic or NAMUR service.

Intended for integration into OEM skids, machines or pre-assembled plant systems, the flowmeter is based on the latest developments within digital signal processing technology - engineered for high measuring performance:

- Fast response to rapid changes in flow
- Fast dosing applications with control in host system
- High immunity against process noise
- High turndown ratio of flowrates
- Suitable for liquid and gas service
- Easy to install, commission and maintain

FC410 is available with Modbus RTU (RS 485) multi-drop serial communication.

The flowmeter is supplied with SensorFlash, a micro SD card containing all relevant certificates.

The SITRANS FC410 flowmeter system consists of a SITRANS FCS400 sensor and a SITRANS FCT010 transmitter always compact mounted.

Benefits

- It is narrow and light, fitting neatly into dense piping arrangements
- Effective separation of measurement from plant vibration
- Reliable measurements due to high signal to noise ratio
- Short overall length; easy drop-in replacement into most existing installations
- Direct connection to host with high-speed Modbus simplifies machine or skid construction and set-up.

Technical specifications

Sizes	DN 15 (½"), DN 25 (1"), DN 50 (2"), DN 80 (3")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (water @ 1 bar pressure loss)	DN 15: 3 700 kg/h (8 157 lb/h) DN 25: 11 500 kg/h (25 353 lb/h) DN 50: 52 000 kg/h (114 640 lb/h) DN 80: 136 000 kg/h (300 000 lb/h)
Power supply	24 V DC ± 20 %; 110 mA
Weight	4.6 ... 50 kg
Material	<ul style="list-style-type: none"> • Sensor <ul style="list-style-type: none"> - Wetted parts 316L stainless steel or Hastelloy C22 - Enclosure 304 stainless steel • Transmitter Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	<ul style="list-style-type: none"> • Measuring tubes <ul style="list-style-type: none"> - 316L 100 bar (1450 psi) - Hastelloy C22 160 bar (2321 psi) • Sensor enclosure 20 bar (DN15, DN 25) 17 bar (DN 50, DN 80) • Sensor enclosure burst pressure >160 bar (all sizes)
Temperature ratings	<ul style="list-style-type: none"> • Process medium -50 ... +200 °C (-58 ... +392 °F) • Ambient -40 ... +60 °C (-40 ... +140 °F)
Process connections	<ul style="list-style-type: none"> • Flanges EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2 • Pipe threads ASME B1.20 (NPT), ISO228-1 G (BSPP), VCO Quick-connect • Hygienic threads DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 • Hygienic clamps DIN 11864-3A, DIN 32676, ISO 2852
Approvals	<ul style="list-style-type: none"> • Hazardous area ATEX, IECEx, FM, NEPSI, CSA, INMETRO (installed with flame-proof conduit) • Pressure equipment PED, CRN • Hygienic 3A, EHEDG • Marine Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
Communication	Modbus RTU
EMC performance	EN 61326-3-2
Mechanical load	18 to 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC410 Digital coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact mounting with FCT010 transmitter	7ME 4 6 1 1 -		Further designs Please add "-Z" to Article No. and specify Order code(s).	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Cable glands	
Sensor size, connection size			Metric, no glands	➤ A01
DN 15, DN 10 (½", 3/8")	➤ 3 F		Metric, plastic	➤ A02
DN 15, DN 15 (½", ½")	➤ 3 G		Metric, brass/Ni plated	A05
DN 15, DN 20 (½", ¾")	➤ 3 H		Metric, stainless steel	A06
DN 15, DN 25 (½", 1")	➤ 3 J		NPT, no glands	A11
DN 25, DN 15 (1", ½")	➤ 3 K		NPT, Plastic	A12
DN 25, DN 25 (1", 1")	➤ 3 L		NPT, brass/Ni plated	A15
DN 25, DN 40 (1", 1½")	➤ 3 N		NPT, stainless steel	A16
DN 50, DN 40 (2", 1½")	➤ 4 B		Integral M12 socket	A20
DN 50, DN 50 (2", 2")	➤ 4 C		Software functions and CT approvals	
DN 80, DN 65 (3", 2½")	➤ 4 J		Standard	➤ B11
DN 80, DN 80 (3", 3")	➤ 4 K		I/O configuration Ch1	
DN 80, DN 100 (3", 4")	4 L		Modbus RTU RS 485	➤ E14
Process connection			I/O configuration Ch2, Ch3 and Ch4	
EN 1092-1 B1, PN 16	➤ A0		None	➤ F00
EN 1092-1 B1, PN 40	➤ A1		The MLFB structure for FC410 systems must be filled to this level, including "-Z" options A., B., E. and F.	
EN 1092-1 B1, PN 63	A2			
EN 1092-1 B1, PN 100	➤ A3			
EN 1092-1 B1, PN 160	B1			
EN 1092-1 D NUT, PN 40	A5			
EN 1092-1 D NUT, PN 63	A6			
EN 1092-1 D NUT, PN 100	A7			
EN 1092-1 D NUT, PN 160	A8			
ANSI B16.5-2009, class 150	➤ D1			
ANSI B16.5-2009, class 300	D2			
ANSI B16.5-2009, class 600	➤ D3			
ANSI B16.5-2009, class 900	D4			
ISO228-1 G pipe thread	➤ E1			
ASME B1.20.1 NPT pipe thread	➤ E3			
DIN 11851 hygienic screwed	➤ F1			
DIN 32676 hygienic Tri-Clamp	➤ G1			
DIN 11864-1A aseptic screwed	➤ H1			
DIN 11864-2A aseptic flanged	➤ H2			
DIN 11864-3A clamped	H3			
ISO 2852 hygienic clamped	➤ J1			
ISO 2853 hygienic screwed	➤ J5			
SMS 1145 hygienic screwed	K1			
12-VCO-4 quick connect	K5			
JIS B2200:2004/10K	L2			
JIS B2220:2004/20K	L4			
JIS B2220:2004/40K	L6			
JIS B2220:2004/63K	L7			
Wetted parts material				
AISI 316L/W1.4435/W1.4404 (100 barg max.)	➤ 1			
Hastelloy C22 (only for 7ME461)	3			
Calibration/Accuracy class				
0.1 % flow, 5 kg/m³ density	➤ 1			
0.1 % flow, 1 kg/m³ density	➤ 4			
Standard fraction calibration	8			
Ex approval				
Non-Ex	➤	A		
ATEX II 2GD	➤	C		
IECEX GDb	➤	F		
FM, Class 1, Div 1	➤	H		
CSA, Class 1, Zone 1	➤	M		

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ➤. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Selection and Ordering data	Order code
Add-on options and accessories	
Please add "-Z" to Article No. and specify Order code(s).	
Certificates	
Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	◆ C10
Factory certificate to EN 10204 2.2	C11
Cable¹⁾	
None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17

¹⁾ M12 versions of cable have a plug at both ends.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC410

Description	Article No.
• English	A5E33120874
• German	A5E33124885
• Spanish	A5E33209358
• French	A5E33209377
• Italian	A5E33209408
• Chinese	A5E33209431

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC410 Digital coriolis flowmeter	7ME 4 6 2 1 -		Further designs	
with SITRANS FCS400 Flow sensor			Please add "-Z" to Article No. and specify Order code(s).	
Hygienic version with Ra < 0.8 µm, 3A approved, and compact mounting with FCT010 transmitter			Cable glands	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Metric, no glands	➤ A01
			Metric, plastic	➤ A02
			Metric, brass/Ni plated	➤ A05
			Metric, stainless steel	➤ A06
			NPT, no glands	➤ A11
			NPT, plastic	➤ A12
			NPT, brass/Ni plated	➤ A15
			NPT, stainless steel	➤ A16
			Integral M12 socket	➤ A20
Sensor size, connection size			Software functions and CT approvals	
DN 15, DN 10 (½", 3/8")	➤ 3 F		Standard	➤ B11
DN 15, DN 15 (½", ½")	➤ 3 G		I/O configuration Ch1	
DN 15, DN 20 (½", ¾")	➤ 3 H		Modbus RTU RS 485	➤ E14
DN 15, DN 25 (½", 1")	➤ 3 J		I/O configuration Ch2, Ch3 and Ch4	
DN 25, DN 25 (1", 1")	➤ 3 L		None	➤ F00
DN 25, DN 32 (1", 1¼")	➤ 3 M		The MLFB structure for FC410 systems must be filled to this level , including "-Z" options A., B., E. and F..	
DN 25, DN 40 (1", 1½")	➤ 3 N		➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ➤. For details see page 9/5 in the appendix.	
DN 50, DN 40 (2", 1½")	➤ 4 B			
DN 50, DN 50 (2", 2")	➤ 4 C			
DN 80, DN 65 (3", 2½")	➤ 4 J			
DN 80, DN 80 (3", 3")	➤ 4 K			
Process connection				
DIN 11851 0.8 µm hygienic screwed	➤ F 1			
DIN 32676 0.8 µm hygienic Tri-Clamp	➤ G 1			
DIN 11864-1 0.8 µm hygienic screwed	➤ H 1			
DIN 11864-2A BF-A 0.8 µm hygienic flanged (metric)	➤ H 2			
DIN 11864-3A BF-A0.8 µm hygienic clamped	➤ H 3			
DIN 11864-2B BF-A0.8 µm hygienic flanged (NPS)	➤ H 4			
ISO 2852 0.8 µm hygienic clamped	➤ J 1			
ISO 2853 0.8 µm hygienic screwed	➤ J 5			
Wetted parts material				
AISI 316L/1.4435 (40 bar max.)	➤ 1			
Calibration/Accuracy class				
0.1 % flow, 5 kg/m³ density	➤ 1			
0.1 % flow, 1 kg/m³ density	➤ 4			
Standard fraction calibration	➤ 8			
Ex approval				
Non-Ex	➤	A		
ATEX II 2GD	➤	C		
IECEX GDb	➤	F		
FM, Class 1, Div 1	➤	H		
CSA, Class 1, Zone 1	➤	M		

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ➤. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Selection and Ordering data Order code

Add-on options and accessories

Please add **"-Z"** to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	◆ C10
Factory certificate to EN 10204 2.2	C11

Cable¹⁾

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

Please add **"-Z"** to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel	Y17
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¹⁾ M12 versions of cable have a plug at both ends.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC410

Description	Article No.
• English	A5E33120874
• German	A5E33124885
• Spanish	A5E33209358
• French	A5E33209377
• Italian	A5E33209408
• Chinese	A5E33209431

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC410 Digital coriolis flowmeter with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact mounting with FCT010 transmitter	7ME 4 7 1 1 -		Further designs Please add "-Z" to Article No. and specify Order code(s).	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Cable glands	
Sensor size, Connection size			Metric, no glands	◆ A01
DN 15, DN 6 (½", ¼")	◆ 3 E		Metric, plastic	◆ A02
DN 15, DN 10 (½", 3/8")	◆ 3 F		Metric, brass/Ni plated	◆ A05
DN 15, DN 15 (½", ½")	◆ 3 G		Metric, stainless steel	◆ A06
DN 15, DN 20 (½", ¾")	◆ 3 H		NPT, no glands	◆ A11
DN 15, DN 25 (½", 1")	◆ 3 J		NPT, plastic	◆ A12
DN 25, DN 25 (1", 1")	◆ 3 L		NPT, brass/Ni plated	◆ A15
DN 25, DN 32 (1", 1¼")	◆ 3 M		NPT, stainless steel	◆ A16
DN 25, DN 40 (1", 1½")	◆ 3 N		Software functions and CT approvals	
DN 50, DN 40 (2", 1½")	◆ 4 B		Standard	◆ B11
DN 50, DN 50 (2", 2")	◆ 4 C		I/O configuration Ch1	
DN 80, DN 65 (3", 2½")	◆ 4 J		Modbus RTU RS 485	◆ E14
DN 80, DN 80 (3", 3")	◆ 4 K		I/O configuration Ch2, Ch3 and Ch4	
DN 80, DN 100 (3", 4")	◆ 4 L		None	◆ F00
Process connection			The MLFB structure for FC410 systems must be filled to this level , including "-Z" options A..., B..., E... and F...	
EN1092-1 B1, PN 16		A 0	◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	
EN1092-1 B1, PN 40	◆	A 1		
EN1092-1 B1, PN 63		A 2		
EN1092-1 B1, PN 100	◆	A 3		
EN1092-1 B1, PN 160		B 1		
EN1092-1 D, PN 40		A 5		
EN1092-1 D, PN 63		A 6		
EN1092-1 D, PN 100		A 7		
EN1092-1 D, PN 160		A 8		
ANSI B16.5, RF, class 150	◆	D 1		
ANSI B16.5, RF, class 300		D 2		
ANSI B16.5, RF, class 600	◆	D 3		
ANSI B16.5, RF, class 900	◆	D 4		
ISO228-1 G pipe thread	◆	E 1		
ASME B1.20.1 NPT pipe thread	◆	E 3		
DIN 11851 Hygienic screwed	◆	F 1		
DIN 32676-C (inch) Hygienic clamped	◆	G 1		
DIN 11864-1 Hygienic screwed	◆	H 1		
DIN 11864-2A BF-A Hygienic flanged metric	◆	H 2		
DIN 11864-3A Hygienic clamped		H 3		
DIN 11864-2B BF-A Hygienic flanged NPS		H 4		
ISO 2852 Hygienic clamped		J 1		
ISO 2853 Hygienic screwed		J 5		
SMS 1145 Hygienic screwed	◆	K 1		
Swagelok Quick Connect	◆	K 5		
JIS B2200/10K		L 2		
JIS B2200/20K		L 4		
JIS B2200/40K		L 6		
JIS B2200/63K		L 7		
Wetted parts material				
AISI 316L/W1.4435/W1.4404 (100 barg max.)	◆	1		
Calibration/Accuracy class				
0.1 % flow, 5 kg/m³ density	◆	1		
0.1 % flow, 1 kg/m³ density	◆	4		
Standard fraction calibration		8		
Ex approval				
Non-Ex	◆	A		
ATEX II 2GD	◆	C		
IECEX GDb	◆	F		
FM, Class 1, Div 1	◆	H		
CSA, Class 1, Zone 1	◆	M		

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Selection and Ordering data Order code

Add-on options and accessories

Please add **"-Z"** to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	◆ C10
Factory certificate to EN 10204 2.2	C11

Cable¹⁾

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

Please add **"-Z"** to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel	Y17
---------------------------------	------------

¹⁾ M12 versions of cable have a plug at both ends.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC410

Description	Article No.
• English	A5E33120874
• German	A5E33124885
• Spanish	A5E33209358
• French	A5E33209377
• Italian	A5E33209408
• Chinese	A5E33209431

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Overview

The flow measuring principle is based on the Coriolis Effect. The FCS400 sensor's measuring tubes are energized by an electro-mechanical driver circuit which oscillates them at their resonance frequency.

Two pick-ups are placed symmetrically upstream and downstream of the central driver. When a process fluid passes through the sensor, the Coriolis Effect will act on the vibrating tubes and cause deflection which can be measured as a phase shift between pick-ups 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated to ensure a stable output from both of the pickups.

The temperatures of the sensor tubes and frame are measured with high precision to provide compensation for changes with temperature in the measuring properties.

The sensor signals are analyzed for flow, density and fluid temperature in the sensor front end. The digital signal is controlled to conform to high Safety Integrated Level (SIL) and sent digitally to the transmitter via standard cable. The FCT030 further calculates total mass and volume, fraction, dosing control and many other functions.

The front-end module has a process noise filter, which can be used to improve the meter's performance when installation and application conditions are not ideal. Typical interferences from process conditions such as pump pulsations, mechanical vibrations, oscillating valves can be reduced considerably.

Integration

The SITRANS FCS400 Massflow sensor is suitable for both indoor and outdoor installation and meets the requirements of Protection Class IP67/NEMA 4X. Optionally the sensor can be supplied with hazardous certification to Class 1 Zone 1 (ATEX, IECEx) or Class 1 Div. 1 (FM).

The flowmeter is bidirectional and can be installed in any orientation. The sensor is self-draining in many positions, with vertical mounting preferred.

It is important to ensure that the sensor tubes are always completely filled with homogeneous fluid; otherwise measuring errors may occur. Suitable fluids are clean liquids, pastes, light slurries or gases. Condensing vapours, aerated liquids or slush are not recommended.

The materials in contact with the process medium must be evaluated for corrosion and erosion resistances for long sensor life.

The pressure drop through the sensor is a function of the properties of the fluid and the flow rate. A pressure loss and accuracy calculator can be found on the Siemens Internet site www.siemens.com/fc430/sizer

The preferred flow direction is indicated by an arrow on the sensor. Flow in the direction of the arrow will be measured as positive. The flow direction can be adjusted at the transmitter to compensate for reverse installation.

Installation orientation

The optimal installation orientation is vertical with the flow upwards. This ensures that suspended solids or bubbles are completely pushed through the sensor. A drain valve below the sensor will allow the pipe and sensor to drain completely.

Supports

In order to support the weight of the flowmeter and to ensure reliable measurements when external effects exist (e.g. plant vibrations), the sensor should be installed in rigidly supported pipelines.

Supports or hangers should be installed symmetrically and stress-free in close proximity to both of the process connections.

Shut-off devices

To conduct a system zero adjustment, secure shut-off devices are required in the pipeline.

Where possible, shut-off devices should be installed both upstream and downstream of the flowmeter.

System design

- The sensor design consists of process connections, inlet and outlet manifolds mounted in a stiff frame and two parallel tubes equally sharing the process medium flow. The meter is protected in a pressure-rated stainless steel enclosure with two purge ports to support a pressure guard in non-Ex applications.
- The sensing tubes are curved in the CompactCurve shape which gives high sensitivity and low pressure loss. The CompactCurve shape was selected to ensure that the smallest flows are measured with optimal signal to noise ratio.
- Vibration mode separation creates a controlled measuring environment only within the CompactCurve part of the tubes. As a result the sensor has high immunity to plant vibration while avoiding large mass balancing of the meter components.
- The 15° slope of the CompactCurve shape ensures secure self-draining when the sensor axis is mounted vertically or up to 10° off vertical.
- The sensor frame is designed to conduct plant vibrations directly through the sensor body to adjacent pipeline while providing isolation of the metering section from the vibration. Careful mounting of the pipeline with regard to minimizing vibration at the meter will ensure a secure measurement environment.

Installation guidelines

- The mass flowmeter does not require any flow conditioning or straight inlet pipe sections. Care should be exercised however to ensure that any upstream valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flow.
- It is always preferred to place the flowmeter upstream of any control valve (what goes in, comes out) or other pipeline component which may cause flashing, cavitation or vibrations.
- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the lowest pressure point in the liquid piping system or where vapour can collect. Install the meter in pipeline sections with high pressure to maintain system pressure and compress any bubbles.
- Drop lines downstream from the flow sensor should be avoided to prevent the meter tube from draining during flowing conditions. A back-pressure device or orifice is recommended to ensure that flow does not separate within the flow sensor but the metering section remains at positive pressure at all times while there is flow.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

- The flowmeter should not come into contact with any other objects. Avoid making attachments to the housing except for the pressure guard components (if required).
- When the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed. A selection of oversize and undersize connections can be ordered - refer to the sizes tables below.
- The flow sensor may be supported at the junction between process connection and the manifold, but should not be used to support adjacent piping. Ensure that the piping is also supported on both sides so that connection stresses are neutral.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section. Direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.2 bar (3 psi) above the vapour pressure of the process fluid.
- Assure that operation below the vapour pressure cannot occur particularly for fluids with low latent heat of vaporisation.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, variable frequency drives, transformers etc.
- When operating meters on a common mounting base the sensors should be mounted and spaced separate from each other to avoid cross-talk and other vibration interferences.
- When operating meters in interconnected pipelines the pipes should be decoupled to prevent cross talk.

Remote system cabling

The system is designed so that standard instrumentation cable with four cores and overall screen or two screened pairs can be used, or cable sets can be ordered with the flowmeter. The cable can be ordered in various set lengths and terminated in the field.

The maximum design length for the sensor cable is 200 m (656.17 ft), limited to 150 m (492 ft) for Ex applications with Class IIC gases. Data transmission speed and process variable update rates may be affected by the cable characteristics. For best results, choose a cable with the following electrical characteristics:

Property	Unit	Value
Resistance	[Ω /km]	59
Characteristic impedance	[Ω]	100 @ 1 MHz
Insulation resistance	[M Ω /km]	200
Maximum voltage	[V]	300

The flowmeter system applies maximum 15 V DC in operation and is certified intrinsically safe. The complete system is insulation tested to 1500 V in production.

Cabling solutions which can be ordered with the flowmeter are as follows:

1. High performance plugged cable using M12 plugs into prepared sockets
2. Cable glands for either metric or NPT threaded terminal housings.
3. Plain cable in set lengths to be passed through flexible and rigid conduit (not supplied) for metric or NPT threaded terminal housings

Cable for items 1, 2 and 3 are available either gray for standard applications or light blue for Ex applications to identify the circuit as intrinsically safe.

Insulation and heating

For applications where pipeline insulation is required for personnel protection or process temperature maintenance, the SITRANS FCS400 flow sensor may also be insulated. The form and material of insulation is not prescribed and entirely depends on the practices at the application location or plant.

Insulation must not be crowded around the sensor pedestal but shaped at a 45° cone to allow the pedestal to radiate excess heat and maintain a suitable working temperature within the front-end housing.

Where trace heating is employed, an electric heating jacket can be ordered as an accessory. It is shaped to the sensor body and controlled from a weatherproof setpoint device.

The jacket can heat the sensor enclosure up to 200 °C (392 °F). However further insulation is also recommended for personnel protection or low loss temperature maintenance.

Calibration

To ensure accurate measurement all flowmeters must be initially calibrated. The calibration of each SITRANS FCS400 coriolis sensor is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK. A calibration certificate is shipped with every sensor and calibration data are stored in the SensorFlash memory unit. The accreditation body DANAK has signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

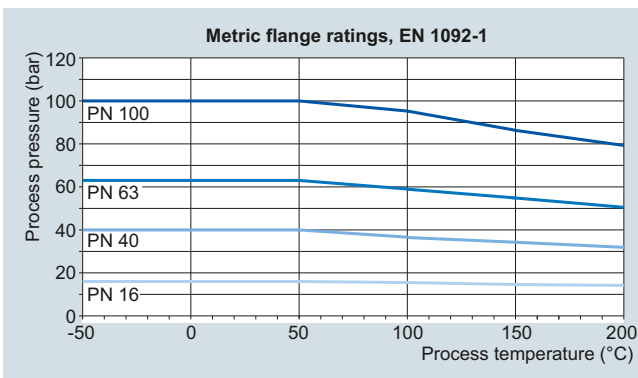
Technical specifications

Flow sensor FCS400		
Parameter	Unit	Value
Process pressure range	[barg (psi)]	316L: 0 ... 100 (0 ... 1450) Hastelloy C22: 0 ... 160 (0 ... 2321)
Process temperature range	[°C (°F)]	-50 ... +200 (-58 ... +392)
Ambient temperature range	[°C (°F)]	-40 ... +60 (-40 ... +140)
Transport temperature range	[°C (°F)]	-40 ... +70 (-40 ... +158)
Density range	[kg/m ³ (lb/ft ³)]	1 ... 5000 (0.062 ... 312.2)
Process media	Fluid group	1 (suitable for dangerous fluids)
	Form	Light slurry, liquid and non-condensing gas
No. of process values		
• Primary process values		<ul style="list-style-type: none"> • Mass flow • Density • Process medium temperature
• Derived process values		<ul style="list-style-type: none"> • Volume flow • Corrected volume flow (with reference density) • Fraction A:B • Fraction % A:B

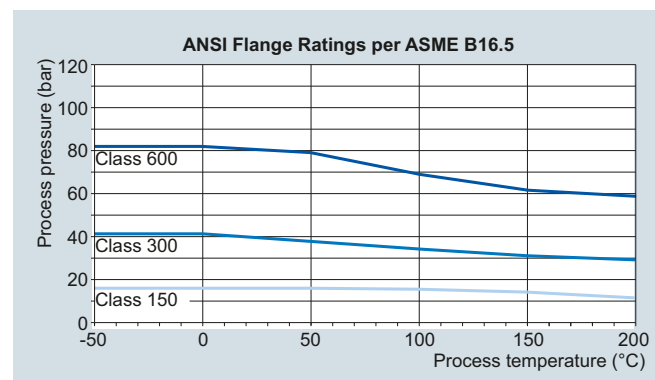
Performance specifications		Sensor			
Parameter	Unit	DN 15	DN 25	DN 50	DN 80
Max. zero point error	[kg/h (lb/min)]	0.2 (0.007)	2.0 (0.072)	7.5 (0.276)	18 (0.66)
Qmin	[kg/h (lb/min)]	20 (0.735)	200 (7.35)	750 (27.6)	900 (33.1)
Qnom	[kg/h (lb/min)]	3 700 (136.0)	11 500 (422.6)	52 000 (1 911)	136 000 (4 997)
Qmax	[kg/h (lb/min)]	31 900 (1 172)	88 400 (3 248)	353 500 (12 990)	904 800 (33 246)
Linearity error	[%]	± 0.1	± 0.1	± 0.1	± 0.1
Repeatability	[%]	± 0.05	± 0.05	± 0.05	± 0.05
Density error	[kg/m ³ (lb/ft ³)]	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)
Extended density calibration	[kg/m ³ (lb/ft ³)]	± 1 (± 0.062)	± 1 (± 0.062)	± 1 (± 0.062)	± 1 (± 0.062)
Temperature error	[°C (°F)]	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)

Pressure/temperature curves

With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS400 product program.



EN1092-1 flanged sensors



ASME B16.5 flanged sensors

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

Sensor variants

SITRANS FCS400 sensors are available in three main variants: Standard, hygienic and NAMUR. A wide range of process connections is available for the FCS400 sensors. The available combinations of type, sensor size and connection size are shown in the tables below.

Standard sensors

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 Hygienic screwed	DIN 32676 Hygienic Tri-clamp	DIN 11864-1A Aseptic screwed	DIN 11864-2A Aseptic flanged	ISO 2852 Hygienic clamped	ISO 2853 Hygienic screwed	SMS 1145 Hygienic screwed	12-VCO-4 Quick connect	JIS B2200:2004/10K	JIS B2200:2004/20K	JIS B2200:2004/40K	
316 Stainless - Standard: 7ME461.-...																									
DN 15 (½")	DN 6 (¼")											o	o												
	DN 10 (¾")													o											
	DN 15 (½")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●					o	o	o	o
	DN 20 (¾")								●	o	●				●										
	DN 25 (1")	o	●		●									o					●	●	o				
DN 25 (1")	DN 15 (½")																								
	DN 25 (1")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●	●	●	o		o	o	o	
	DN 32 (1¼")													o											
DN 40 (1½")	o	●		o				o	o	o				●				o	o						
DN 50 (2")	DN 25 (1")																								
	DN 40 (1½")	o	●	o	●	o	o	o						o		o	●	o	o	o					
	DN 50 (2")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●	●	●	o		o	o	o	
	DN 65 (2½")																								
DN 80 (3")	DN 50 (2")																								
	DN 65 (2½")	o	●	o	o				●	o	●			●											
	DN 80 (3")	o	●	o	●	o	o	o	●	o	●			●	●	●	●	●	●	o		o	o	o	
DN 100 (4")	o	o	o	o																					

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown o are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Hygienic sensor variants

The hygienic sensors all have maximum internal surface roughness < 0.8 µm and are EHEDG and 3A approved. Hygienic sensors are offered with process connection conforming to various international quick-connect clamps or threaded connectors. Pressure ratings are according to the relevant standard and the sensor size. Maximum pressure in the hygienic program is PN 40.

Sensor	Connection	316 SS - Hygienic: 7ME462-...					
		DIN 11851 0.8 µm screwed	DIN 32676 0.8 µm Tri-clamp	DIN 11864-1 0.8 µm screwed	DIN 11864-2 0.8 µm flanged	ISO 2852 0.8 µm clamped	ISO 2853 0.8 µm screwed
DN 15 (1/2")	DN 6 (1/4")						
	DN 10 (3/8")	○					
	DN 15 (1/2")	●	●	●	●		
	DN 20 (3/4")		●				
	DN 25 (1")	○				●	●
DN 25 (1")	DN 15 (1/2")						
	DN 25 (1")	●	●	●	●	●	●
	DN 32 (1 1/4")	○					
	DN 40 (1 1/2")		●			○	○
DN 50 (2")	DN 25 (1")						
	DN 40 (1 1/2")	○		○	●	○	○
	DN 50 (2")	●	●	●	●	●	●
	DN 65 (2 1/2")						
DN 80 (3")	DN 50 (2")						
	DN 65 (2 1/2")	●					
	DN 80 (3")	●	●	●	●	●	●
	DN 100 (4")						

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown ○ are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Aseptic flanged process connections

The aseptic flanges offered for FCS400 conform with the standard DIN 11864-2A BF-A. The flange fitted to the sensor is therefore the back flange and the seal is an O-ring.

The flange dimensions in the FCS400 program are as follows:

Size DN	Pipe	Bore d ₁	Ring OD d ₁₁	Bolt Circle d ₅	Bolt holes	Flange diameter d ₁₀
10	13 x 1.5	10	22.4	37	4 x Ø9	54
15	19 x 1.5	16	28.4	42	4 x Ø9	59
20	23 x 1.5	20	32.4	47	4 x Ø9	64
25	29 x 1.5	26	38.4	53	4 x Ø9	70
32	35 x 1.5	32	47.7	59	4 x Ø9	76
40	41 x 1.5	38	53.7	65	4 x Ø9	82
50	53 x 1.5	50	65.7	77	4 x Ø9	94
65	70 x 2.0	66	81.7	95	8 x Ø9	107
80	85 x 2.0	81	97.7	112	8 x Ø11	113

DIN 11864-2A BF-A flange dimensions

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

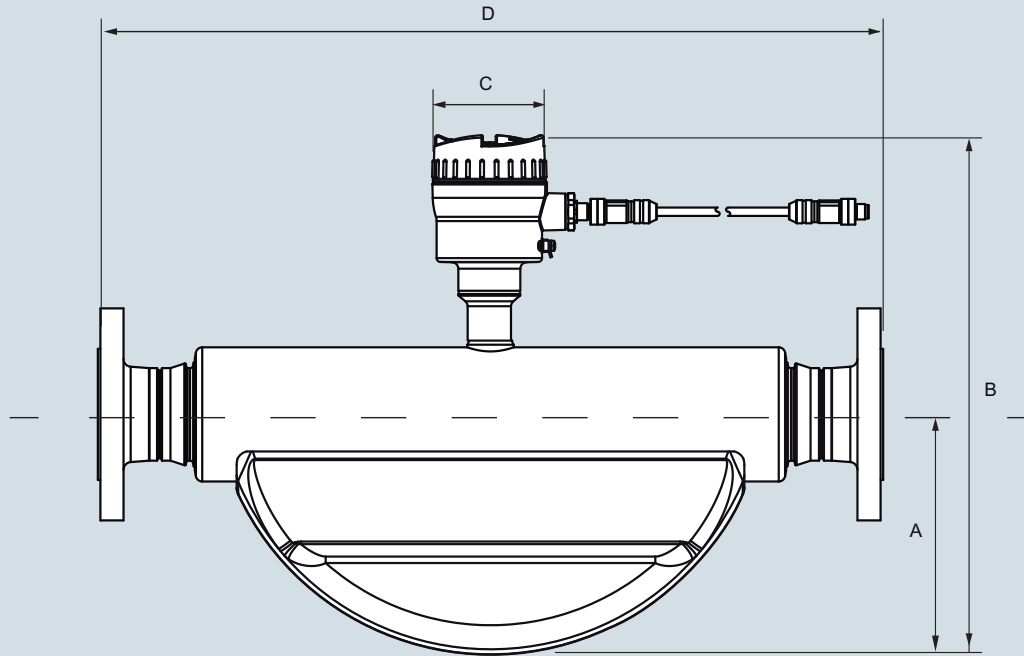
NAMUR sensor variants

The NAMUR variants have build-in lengths according to NAMUR recommendation NE 132. The recommendations of NE 132 are stated for sensors with flanges the same size as the sensor nominal size, and for flanges to EN1092-1 PN 40 with B1 flange facing. For couplings of other standards such as ASME B16.5 Class 150, the overall length incorporates the difference in length between standard EN and ASME flanges. NAMUR variants are offered with flange and pipe thread connections according to EN, ISO and ASME standards, as shown in the table below.

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 Hygienic screwed	DIN 32676 Hygienic Tri-clamp	DIN 11864-1 A Aseptic screwed	DIN 11864-2 A Aseptic flanged	ISO 2852 Hygienic clamped	ISO 2853 Hygienic screwed
316 Stainless - NAMUR: 7ME471-...																			
DN 15 (½")	DN 6 (¼")											○	○						
	DN 10 (⅜")													○					
	DN 15 (½")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●		
	DN 20 (¾")								●	○	●				●				
	DN 25 (1")	○	●		●										○				●
DN 25 (1")	DN 15 (½")																		
	DN 25 (1")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●	●	●
	DN 32 (1¼")													○					
	DN 40 (1½")	○	●		○				○	○	○				●			○	○
DN 50 (2")	DN 25 (1")																		
	DN 40 (1½")	○	●	○	●	○	○	○						○		○	●	○	○
	DN 50 (2")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●	●	●
	DN 65 (2½")	○																	
DN 80 (3")	DN 50 (2")																		
	DN 65 (2½")	○	●	○	○				●	○	●			●					
	DN 80 (3")	○	●	○	●	○	○	○	●	○	●			●	●	●	●	●	●
	DN 100 (4")	○	○	○	○														

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown ○ are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Dimensional drawings



Sensor		A		B		C		Weight	
[DN]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[kg]	[lb]
15	½	90	3.54	280	11.02	90	3.54	4.6	10.14
25	1	115	4.53	315	12.40	90	3.54	7.9	17.42
50	2	180	7.09	390	15.35	90	3.54	15	33.07
80	3	294	11.57	424	16.69	90	3.54	53	116.84

SITRANS FCS400, dimensions in mm (inch), weights in kg (lb), for a EN 1092 PN 40 flanged version.

The build-in length D depends on the flange.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

Overall length

The overall length (build-in length) of each sensor depends on the connection standard and the pressure rating. The tables below summarize the dimensions available at the time of publishing. Please contact Siemens for further information about our desired process connection specification.

316L stainless - Standard: 7ME461.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1092-1 B1, PN 16			265		265	360			610	610	915	840	840
EN 1092-1 B1, PN 40			265		265	360		365	610	610	915	840	840
EN 1092-1 B1, PN 63			265			360			610	610	915	915	915
EN 1092-1 B1, PN 100			270		275	360			610	610	915	915	915
ANSI B16.5, class 150			270	270		360		365		620	915	875	
ANSI B16.5, class 300			270	270		360		380		620	915	875	
ANSI B16.5, class 600			270	285		360		380		620	915	875	
ISO 228-1 GH pipe thread	265		265			365				620			
ANSI B1.20.1 NPT pipe thread	265		270			365				620			
DIN 11851 Hygienic screwed		265	265		193	360	360		610	610	840	840	
DIN 32676-C Hygienic clamp			265	265		360		360		610		875	
DIN 11864-1 Aseptic screwed			265	265		360				610		875	
DIN 11864-2 Aseptic flange			265	265		360		274	620	610		875	
ISO 2852 Hygienic clamp					265	360			610	610		840	
ISO 2853 Hygienic screwed			265			360		274		610		860	

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1092-1 B1, PN 16			10.43		10.43	14.17			24.02	24.02	36.02	33.07	33.07
EN 1092-1 B1, PN 40			10.43		10.43	14.17		14.37	24.02	24.02	36.02	33.07	33.07
EN 1092-1 B1, PN 63			10.43			14.17			24.02	24.02	36.02	36.02	36.02
EN 1092-1 B1, PN 100			10.63		10.83	14.17			24.02	24.02	36.02	36.02	36.02
ANSI B16.5, class 150			10.63	10.63		14.17		14.37		24.41	36.02	34.45	
ANSI B16.5, class 300			10.63	10.63		14.17		14.96		24.41	36.02	34.45	
ANSI B16.5, class 600			10.63	11.22		14.17		14.96		24.41	36.02	34.45	
ISO 228-1 GH pipe thread	10.43		10.43			14.37				24.41			
ANSI B1.20.1 NPT pipe thread	10.43		10.63			14.37				24.41			
DIN 11851 Hygienic screwed		10.43	10.43		7.60	14.17	14.17		24.02	24.02	33.07	33.07	
DIN 32676-C Hygienic clamp			10.43	10.43		14.17		14.17		24.02		34.45	
DIN 11864-1 Aseptic screwed			10.43	10.43		14.17				24.02		34.45	
DIN 11864-2 Aseptic flange			10.43	10.43		14.17		10.78	24.41	24.02		34.45	
ISO 2852 Hygienic clamp					10.43	14.17			24.02	24.02		33.07	
ISO 2853 Hygienic screwed			10.43			14.17		10.78		24.02		33.86	

SITRANS FCS400, overall length, dimensions in inch

316L stainless - Hygienic 0.8 µm: 7ME462-...

Sensor	DN 15 (½")				DN 25 (1")			DN 50 (2")		DN 80 (3")	
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")
DIN 11851 Hygienic screwed	265	265			360	360		610	610	840	840
DIN 32676-C Hygienic clamp		265	265		360		360		610		875
DIN 11864-1 Aseptic screwed		265			360				610		875
DIN 11864-2 Aseptic flange		265			360			620	610		875
ISO 2852 Hygienic clamp				265	360			610	610		840
ISO 2853 Hygienic screwed				265	360				610		860

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")				DN 25 (1")			DN 50 (2")		DN 80 (3")	
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")
DIN 11851 Hygienic screwed	10.43	10.43		7.60	14.17	14.17		24.20	24.20	33.07	33.07
DIN 32676-C Hygienic clamp		10.43	10.43		14.17		14.17		24.20		34.45
DIN 11864-1 Aseptic screwed		10.43			14.17				24.20		34.45
DIN 11864-2 Aseptic flange		10.43			14.17			24.41	24.20		34.45
ISO 2852 Hygienic clamp				10.43	14.17			24.20	24.20		33.07
ISO 2853 Hygienic screwed				10.43	14.17				24.20		33.86

SITRANS FCS400, overall length, dimensions in inch

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

316L stainless - NAMUR: 7ME471.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1092-1 B1, PN 16			510		510	600			715	715	915	915	915
EN 1092-1 B1, PN 40			510		510	600			715	715	915	915	915
EN 1092-1 B1, PN 63			510			600			715	715	915	915	915
EN 1092-1 B1, PN 100						600			715	715	915	915	915
EN 1092-1 D, PN 16			510			600			715	715		915	
EN 1092-1 D, PN 40			510			600			715	715		915	
EN 1092-1 D, PN 63						600			715	715		915	
ANSI B16.5, class 150						600					915		
ANSI B16.5, class 300						600					915		
ANSI B16.5, class 600						600					915		
ISO 228-1 GH pipe thread	510		510										
ANSI B1.20.1 NPT pipe thread	510												
DIN 11851 Hygienic screwed		510	510			600	600		715	715	915	915	
DIN 32676-C Hygienic clamp			510	510		600		600		715			
DIN 11864-1 Aseptic screwed			510			600				715			
DIN 11864-2 Aseptic flange													
ISO 2852 Hygienic clamp					510	600			715	715		915	
ISO 2853 Hygienic screwed					510	600				715			

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1091-1 B1, PN 16			20.08		20.08	23.62			28.15	28.15	36.02	36.02	36.02
EN 1091-1 B1, PN 40			20.08		20.08	23.62			28.15	28.15	36.02	36.02	36.02
EN 1091-1 B1, PN 63			20.08			23.62			28.15	28.15	36.02	36.02	36.02
EN 1091-1 B1, PN 100						23.62			28.15	28.15	36.02	36.02	36.02
EN 1092-1 D, PN 16			20.08			23.62			28.15	28.15		36.02	
EN 1092-1 D, PN 40			20.08			23.62			28.15	28.15		36.02	
EN 1092-1 D, PN 63						23.62			28.15	28.15		36.02	
ANSI B16.5, class 150						23.62					36.02		
ANSI B16.5, class 300						23.62					36.02		
ANSI B16.5, class 600						23.62					36.02		
ISO 228-1 GH pipe thread	20.08		20.08										
ANSI B1.20.1 NPT pipe thread	20.08												
DIN 11851 Hygienic screwed		20.08	20.08			23.62	23.62		28.15	28.15	36.02	36.02	
DIN 32676-C Hygienic clamp			20.08	20.08		23.62		23.62		28.15			
DIN 11864-1 Aseptic screwed			20.08			23.62				28.15			
DIN 11864-2 Aseptic flange													
ISO 2852 Hygienic clamp					20.08	23.62			28.15	28.15		36.02	
ISO 2853 Hygienic screwed					20.08	23.62				28.15			

SITRANS FCS400, overall length, dimensions in inch

Overview



FCT030 is based on the latest developments within digital signal processing technology – engineered for high measuring performance, fast response to step changes in flow, fast dosing applications, high immunity against process noise, easy to install commission and maintain.

The FCT030 transmitter delivers true multi-parameter measurements i.e. massflow, volumeflow, corrected volumeflow, density, temperature and fraction.

The FCT030 IP67 transmitter can be remote connected or compact mounted with all sensors of type FCS400, sizes DN 15 to DN 80.

Fraction

The transmitter FCT030 can be set up at works to measure and report various fraction concentrations of two-part mixtures or solutions. Where a discrete relationship exists between concentration and density at particular temperatures a calculation is performed and the percentage concentration by volume or mass of Part A or Part B (100 % minus Part A) is measured. For solutions and some mixtures the total mass, or dry weight, is also available.

In some industries, a selection of standard density scales has been adopted to represent the density or relative density of the process fluid.

If "Standard fractions" option is chosen at ordering, the following fraction or standard density scales can be selected in the setup menu:

- | | |
|--------------------|-------------------------------|
| • API number | • Twaddell |
| • Balling | • %HFCS42 |
| • °Baumé light | • %HFCS55 |
| • °Baumé heavy | • %HFCS90 |
| • °Brix | • Ethanol-Water 0 % to 20 % |
| • °Oeschlé° | • Ethanol-Water 15 % to 35 % |
| • Plato | • Ethanol-Water 30 % to 55 % |
| • Specific Gravity | • Ethanol-Water 50 % to 100 % |

Application

SITRANS FC430 mass flowmeters are suitable for applications within the entire process industry where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

Coriolis flowmeters can be applied in all industries, such as:

- Chemical & Pharma: detergents, bulk chemicals, acids, alkalis, pharmaceuticals, blood products, vaccines, insulin production

- Food & Beverage: dairy products, beer, wine, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO₂ dosing, CIP/SIP-liquids, mixture recipe control
- Automotive: fuel injection nozzle & pump testing, filling of AC units, engine consumption
- Oil & Gas: filling of gas bottles, furnace control, test separators
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerisation
- Water & Waste Water: dosing of chemicals for water treatment

The multiple outputs and bus communication mean that all of the process information can be read either instantaneously (10 ms update) or periodically as plant operation requires.

Benefits

Flow calculation and measurement

- Dedicated mass flow calculation with patented DSP technology
- Fast dosing and flow step response with maximum 10 ms response time.
- 100 Hz update rate to all outputs
- Maximum data age from pickup to output is 20 ms (two update cycles)
- Independent low flow cut-off settings for mass and volume flowrates
- Automatic zero-point adjustment on command from discrete input or host system
- Empty pipe monitoring

Operation and display

- User-configurable operation display
 - Full graphical display 240 x 160 pixels with up to 6 programmable views
 - Self-explaining alarm handling/log in clear text
 - Help text for all parameters appears automatically in the configuration menu
 - Keypad can be used for controlling dosing as start/stop/hold/reset
- SensorFlash technology stores production specific system documentation and provides removable memory of all flowmeter setups and functions
 - Calibration certificates
 - Pressure and material test certificates (as ordered)
 - Non-volatile memory backup of operational data
 - Transfer of user configuration to other flowmeters

Alarms and safety

- Advanced diagnosis and service menu enhances troubleshooting and meter validation
- Configurable upper and lower alarm and warning limits for all process values
- Alarm handling can be selected between Siemens and NAMUR standard configurations
- Designed from the ground up and certified for integrated safety in accordance with IEC 61508 and IEC 61511.
 - SIL 2 (single-channel operation)
 - SIL 3 (dual-channel operation)
 Unlike many systems which are certified in practice, the SITRANS FC430 system is certified in design, which is a higher qualification and more robust for secure implementation of safety systems.

Outputs and control

- Built-in dosing controller with compensation and monitoring comprising 3 built-in totalizers
- Multi-parameter outputs, individually configurable for massflow, volumeflow, corrected volumeflow, density, temperature or fraction flow such as °Brix or °Plato

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

Up to four I/O channels are configured as follows:

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.2 which can be validated and setup for safety critical applications (SIL 2). The current signal can be configured for massflow, volume flow or density.

Channel 2

Channel 2 is a signal output which can be freely configured for any process variable.

- Analog current (0/4 to 20 mA)
- 3 stage analog valve dosing control
- Frequency or pulse
- Discrete one or two-valve dosing control in combination with channel 3 or 4
- Operational and alarm status

Channels 3 and 4

Channels 3 and 4 can be ordered with signal (freely configured for any process variable) or relay outputs, or signal input.

Signal

Signal output can be user configured to:

- Analog current (0/4 to 20 mA)
- 3 stage analog valve dosing control
- Frequency or pulse
- Redundant frequency or pulse (linked to Channel 2)
- Discrete one or two-valve dosing control
- Operational and alarm status

Relay

Relay output(s) can be user configured to:

- Discrete one or two-valve dosing control
- Operation status including flow direction
- Alarm status

Signal input

Signal input can be user-configured for

- Dosing control
- Totalizer reset functions
- Force or freeze output(s)
- Initiate automatic zero point adjustment

Signal outputs and inputs are individually ordered as active or passive.

During service and maintenance all outputs can be forced to a preset value for simulation, verification or calibration purposes.

Approvals and certificates

The FC430 coriolis flowmeter program was designed from the ground up to comply with or exceed the requirements of international standards and regulations.

Design

The transmitter SITRANS FCT030 is designed in an IP67/NEMA 4X aluminum enclosure with corrosion resistant coating. It can be remote connected or compact mounted with an FCS400 sensor of size DN 15, DN 25, DN 50 or DN 80.

FCT030 is available as standard with one current, HART 7.2 output and can be ordered with additional input/output functions.

The transmitter has a modular design with discrete, replaceable electronic modules and connection boards to maintain separation between functions and facilitate field service. All modules are fully traceable and their provenance is included in the transmitter setup.

SensorFlash

SensorFlash is a standard, 1 GByte micro SD card with the ability to be updated by PC. It is supplied with each sensor with the complete set of certification documents including calibration report. Material, pressure test, factory conformance certificates are optional at ordering.

The Siemens SensorFlash memory unit offers the following features and benefits:

- Automatically program any similar transmitter in seconds to the operation standard
- Transmitter replacement in less than 5 minutes
- True "plug & play" provided by integrated cross-checking data consistency and HW/SW version verification
- Permanent database of operational and functional information from the moment that the flowmeter is switched on
- New firmware updates can be downloaded from the SIEMENS internet portal for Product Support and placed onto SensorFlash (unmounted from the transmitter and inserted into a PC's SD card slot). The firmware is then inserted into the existing flowmeter and the complete system upgraded.

Function

The following functions are available:

- Mass flowrate, volume flowrate, density, process temperature, fraction flow
- Up to four output/input channels selected at ordering
- Outputs can be individually configured with mass, volume, density etc.
- Three built-in totalizers which can count positive, negative or net flows
- Low flow cut-off, adjustable
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Internal data logger is updated each 10 minutes with operational data such as system health, totalizer values, all configurations and data needed for Custody Transfer requirements to OIML R 117
- Display of operating time with real-time clock. Daylight saving time is not implemented
- Uni/bidirectional flow measurement
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Limit switches programmable for flow, density, temperature or fraction process values. Limit points can be graded as warning and alarm for values both above and below nominal process conditions
- Process noise filter for optimization of measurement performance under non-ideal application conditions. 5-stage pumping filter compensates for flow fluctuations caused by e.g. single acting piston pumps
- Full dosing controller with 5 user-configurable recipes
- Automatic zero adjustment menu, with zero point evaluation display
- Full service menu for effective and straight forward application and meter troubleshooting
- Precise temperature measurement ensures optimum accuracy on massflow, density and fraction flow.
- Fraction flow computation is based on a 5th-order algorithm matching known applications. All standard fraction calculations fit within 0.1% of the true value.

Technical specifications

Process media	<ul style="list-style-type: none"> Fluid Group 1 (suitable for dangerous fluids) Aggregate state: Paste/light slurry, liquid and gas 	Ambient temperature	
Number of process variables	7	Operation	
Measurement of	<ul style="list-style-type: none"> Mass flow Volume flow Density Process media temperature Corrected volume flow Reference density Fraction A flow Fraction B flow Fraction A % Fraction B % 	<ul style="list-style-type: none"> Transmitter Display 	-40 ... +60 °C (-40 ... +140 °F), (humidity max. 95 %) -20 ... +60 °C (-4 ... +140 °F)
Current output		Storage	
Current	0 ... 20 mA or 4 ... 20 mA (Channel 1 only 4 ... 20 mA)	<ul style="list-style-type: none"> Transmitter Display 	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %) -20 ... +70 °C (-4 ... +158 °F)
Load	< 500 Ω per channel	Communication	HART 7.2
Time constant	0 ... 100 s adjustable	Enclosure	
Digital output¹⁾		Material	Aluminum
Pulse	41.6 μs ... 5 s pulse duration	Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Frequency	0 ... 10 kHz, 50 % duty cycle, 120 % overscale provision	Mechanical load	18 ... 400 Hz random, 3.17 g RMS, in all directions
Time constant	0 ... 100 s adjustable	Supply voltage	
Active	0 ... 24 V DC, 110 mA, short-circuit-protected	Supply	20 ... 27 V DC ± 10%; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz
Passive	3 ... 30 V DC, max. 110 mA	Fluctuation	No limit
Relay		Power consumption	7.5 W/15 VA
Type	Change-over voltage-free relay contact	EMC performance	
Load	30 V AC/100 mA	Emission	EN/IEC 61326-1-4 (Industry)
Functions	Alarm level, alarm number, limit, flow direction	Immunity	EN/IEC 61326-1-2 (Industry)
Digital input		NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Voltage	15 ... 30 V DC (2 ... 15 mA)	Environment	
Functionality	Start/stop/hold/continue dosing, reset totalizer 1 and 2, force out- put, freeze output	Environmental conditions acc. to IEC/EN/UL 61010-1	<ul style="list-style-type: none"> Altitude up to 2000 m Pollution degree 2
Galvanic isolation	All inputs and outputs are galva- nically isolated, isolation voltage 500 V.	Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Cut-off		Cable glands	Cable gland are available in Nylon, Nickel plated brass or stainless steel (316L/W1.4404) in the following dimensions: <ul style="list-style-type: none"> M20 ½" NPT
Low-flow	0 ... 9.9 % of maximum flow	Cable	Standard industrial signal cable up to 200 m long with 2 x screened pairs or 4-wire overall screen can be laid between the sensor and transmitter. Siemens offers cables in a selection of pre- cut lengths and prepared for either gland or plug connection.
Limit function	Mass flow, volume flow, fraction, density, sensor temperature		
Totalizer	Three eight-digit counters for for- ward, net or reverse flow		
Display	<ul style="list-style-type: none"> Background illumination with alphanumeric text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 Reverse flow indicated by negative sign 		
Zero point adjustment	Via keypad or remote via digital input		

¹⁾ With 300 Ω internal impedance. For coil switching use the passive output option.

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

Approvals

Hazardous area

- ATEX Ex II 2(1) GD
Ex d e [ia] ia IIC T6 Gb

- FM/CSA Class1 Div. 1

- IECEx II 2(1) GD
Ex d e [ia] ia IIC T6 Gb

Custody transfer

- OIML R 117 type approval to a wide variety of liquids other than water

Pressure equipment

- PED

- CRN

Hygienic applications

- EHEDG for hygienic variant sensors

- 3A for hygienic variant sensors

- External cleanability satisfies EHEDG and 3A rules

Certificates

Safety Integration Level (applies only to compact versions)

- SIL 3 for software
- SIL 2 for hardware
- SIL 3 for redundant hardware systems

CE mark

- Pressure equipment
- Low voltage directive

- WEEE

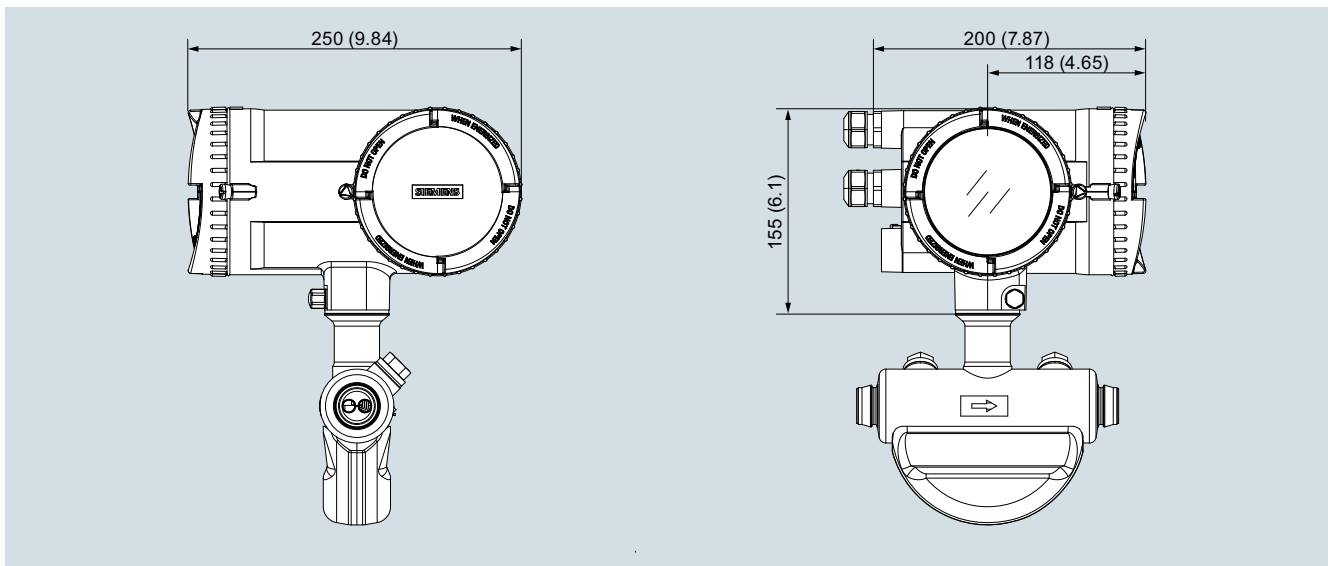
- RoHS

Regional certifications

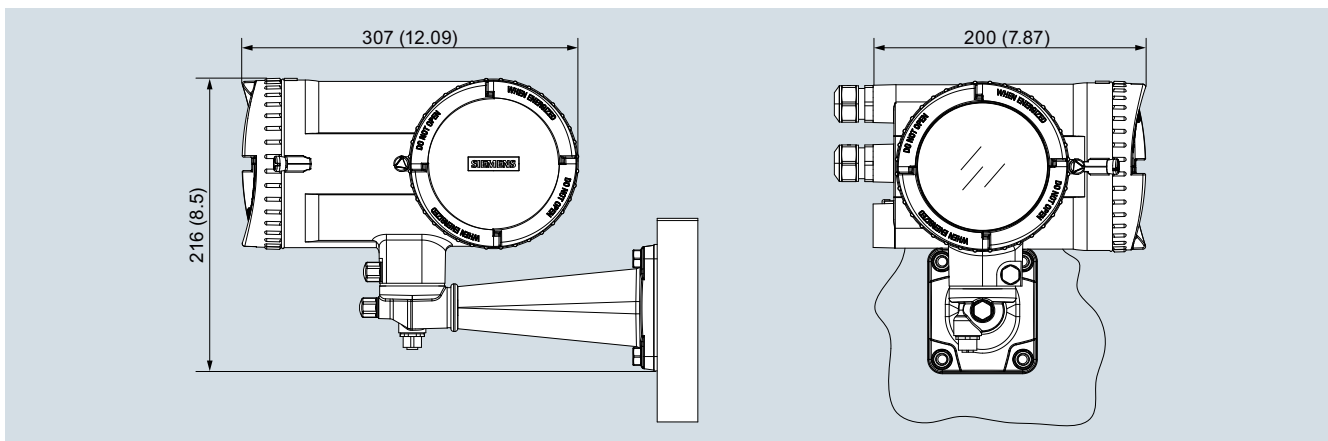
- C-TICK (Australia and New Zealand EMC)

- NEPSI (China Ex)

Dimensional drawings



















SITRANS FCT030, compact version, dimensions in mm (inch)



SITRANS FCT030, remote version, dimensions in mm (inch)

Accessories



Description	Article No.	
CT plug Tamper cover for CT locking. Fits over the M12 plug at both sensor and transmitter ends of the remote system cable	A5E31478498	
Bag of glands (metric) in black plastic ¹⁾	A5E03907414	
Bag of glands, (metric) in gray plastic Ex e/i ¹⁾	A5E03907424	
Bag of glands (metric) in AISI 316 SS Ex e/i ¹⁾	A5E03907429	
Bag of glands (metric) in NiPlatedBrass Ex e/i ¹⁾	A5E03907430	
Bag of glands (NPT) in black plastic ²⁾	A5E03907435	
Bag of glands (NPT) in gray plastic Ex e/i ²⁾	A5E03907451	
Bag of glands (NPT) in AISI 316 SS Ex e/i ²⁾	A5E03907467	
Bag of glands (NPT) in NiPlatedBrass Ex e/i ²⁾	A5E03907473	
Standard cable (non-Ex) with M12 plugs, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	A5E03914805	
• 10 m (32.8 ft)	A5E03914850	
• 25 m (82 ft)	A5E03914853	
• 50 m (164 ft)	A5E03914859	
• 75 m (246 ft)	A5E03914861	
• 150 m (492 ft)	A5E03914874	
Standard cable (non-Ex) for termination, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	A5E03914833	
• 10 m (32.8 ft)	A5E03914849	
• 25 m (82 ft)	A5E03914854	
• 50 m (164 ft)	A5E03914856	
• 75 m (246 ft)	A5E03914864	
• 150 m (492 ft)	A5E03914873	

Description	Article No.	
Standard cable (Ex) with M12 plugs, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m	A5E03914929	
• 10 m	A5E03914962	
• 25 m	A5E03914995	
• 50 m	A5E03915004	
• 75 m	A5E03915074	
• 150 m	A5E03915088	
Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m	A5E03914945	
• 10 m	A5E03914973	
• 25 m	A5E03914984	
• 50 m	A5E03915015	
• 75 m	A5E03915057	
• 150 m	A5E03915100	
Suitcase for comprehensive sales and training for FC430	A5E31467598	
It comes in a special suitcase with a fan implemented that allows the flowmeter to demonstrate airflow.		
Suitcase for comprehensive sales support and training for FC410.	A5E33219071	
It comes in a special suitcase with an S7-1200 PLC and HMI touch-screen display. The operating code is open-source and can be copied to customers to assist with system integration.		
Service toolkit for field maintenance of transmitter and sensor components. Contains all hand tools necessary for maintenance. Other tools may be required for installation.	A5E03722877	

Flow Measurement

SITRANS F C

Flowmeter - Accessories/Spare parts



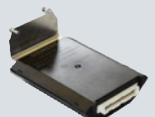



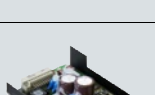




Description	Article No.	
Heating Jacket, indoor use, 0 ... 200 °C (32 ... 392 °F) max. temperature. Complete with 5 m (16.4 ft) high temperature cable fitted. Dedicated plug connection to controller <ul style="list-style-type: none"> • 230 V AC <ul style="list-style-type: none"> - DN 15 electric A5E33035287 - DN 25 electric A5E33035324 - DN 50 electric A5E33035325 - DN 80 electric A5E33035336 • 115 V AC <ul style="list-style-type: none"> - DN 15 electric A5E32877520 - DN 25 electric A5E32877556 - DN 50 electric A5E32877557 - DN 80 electric A5E32877561 		
Heating jacket controller, IP65. Digital display for 0 ... 200 °C (32 ... 392 °F) control setpoint <ul style="list-style-type: none"> • 230 V AC A5E03839193 • 115 V AC A5E03839194 		


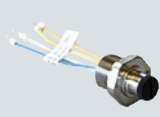



¹⁾ 2 pcs M20; 1 pce M25 with single and dual cable inserts

²⁾ 2 pcs ½" NPT; 1 pce ½" NPT with single and dual cable inserts





Description	Dimension	Article No.
Mating parts for hygienic fittings DIN 11851 Includes: <ul style="list-style-type: none"> • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets 	DN 10	FDK:085U1016
	DN 15	FDK:085U1017
	DN 25	FDK:085U1019
	DN 32	FDK:085U1020
	DN 40	FDK:085U1021
	DN 50	FDK:085U1022
Mating parts for hygienic clamp ISO 2852 Includes: <ul style="list-style-type: none"> • 2 clamps • 2 mating parts • 2 EPDM gaskets 	25 mm	FDK:085U1029
	40 mm	FDK:085U1031
	50 mm	FDK:085U1032
2 EPDM gaskets with collar for mounting set DIN 11851	DN 10	FDK:085U1006
	DN 15	FDK:085U1007
	DN 25	FDK:085U1009
	DN 32	FDK:085U1010
	DN 40	FDK:085U1011
	DN 50	FDK:085U1012
	DN 65	FDK:085U1013

Spare parts - transmitter FCT030

Description	Article No.	
Display and keypad assembly with firewire connection to the transmitter module	A5E03548971	
Sensor interface (Compact). Front end flow calculator and process detection. SIL 3 approved	A5E03549142	
Sensor interface (Remote); barrier unit for high speed digital communication and Ex ib power supply to remote front end DSL module	A5E03549098	
Display lid in painted aluminum with Ex glass plate and o-ring seal	A5E03549344	
Transmitter cassette (active) with SIL approved 4 ... 20 mA output and HART 7.2	A5E03549357	
Transmitter cassette (passive) with SIL approved 4 ... 20 mA output and HART 7.2	A5E03549383	
Bag of loose spare parts; including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind plugs, and o-rings	A5E03549396	
Power supply 240 V AC, 47 ... 63 Hz 24 ... 90 V DC	A5E03549413	
Blind lid in painted aluminum with o-ring seal	A5E03549429	
I/O assembly Advise Order code F00 to F97 from Selection and Ordering data	A5E03939114	
SensorFlash (1 GB micro SD card)	A5E03915258	

Description	Article No.	
Mounting bracket - FCT030; in painted aluminum for pipe or wall mounting of transmitter FCT030 remote version. Including lock ring, pressure pads and seal cap	A5E03906091	
M12 option for sensor housing in stainless steel. Pre-wired and potted to replace M12 socket in DSL housing	A5E03906095	
M12 option - remote - in painted aluminum. Pre-wired and potted replacement M12 connection for FCT030 transmitter remote version	A5E03906104	
Remote terminal house - M20	A5E03906112	
Remote terminal house - NPT - in painted aluminum for sensor cable termination at FCT030 transmitter remote version. Pre-wired and potted	A5E03906130	

Spare parts - sensor FCS400

Description	Article No.	
Blind lid in painted aluminum with o-ring seal	A5E03549295	
Sensor link insert. Front end flow calculator and process detection. SIL 3 approved	A5E03549191	
Sensor housing metric	A5E03549313	
Sensor housing NPT in painted aluminum	A5E03906080	
Bag of loose parts for sensor; including cable strain relief components, washer, seals, o-rings, and assorted screws	A5E03549324	

Flow Measurement

SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Overview



MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

The MASS 6000 IP67 transmitter can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100/MC2 and FC300 sensors.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm.
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances troubleshooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as Brix or Plato
- Digital input for batch control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Self-explaining error handling/log in text format
 - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type, output settings
 - Any values or settings changed by users are stored automatically
 - Automatically re-programming any new transmitter without loss of accuracy
 - Transmitter replacement in less than 5 minutes.
 - True "plug & play"

- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow.
- Fraction flow computation based on a 3rd-order algorithm matching all applications.
- USM II platform enables fitting of add-on bus modules without loss of functionality.
 - All modules can be fitted through true "plug & play"
 - Module and transmitter are automatically configured through the SENSORPROM.
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

The main applications for the MASS 6000 IP67 transmitter can be found in:

- Food and beverage industries
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed in an IP67/NEMA 6 compact polyamide enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40 (1/8" to 1½") and remote mounted for the entire sensor series.

The MASS 6000 IP67 is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Error system consisting of error-log, error pending menu
- Display of operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter troubleshooting

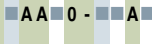
Technical specifications

Measurement of	Mass flow [kg/s (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ , (lb/ft ³)], temperature [°C (°F)]	
Current output		
Current	0 ... 20 mA or 4 ... 20 mA	
Load	< 800 Ω	
Time constant	0 ... 99.9 s adjustable	
Digital output		
Frequency	0 ... 10 kHz, 50 % duty cycle	
Time constant	0 ... 99.9 s adjustable	
Active	24 V DC, 30 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ, short-circuit-protected	
Passive	3 ... 30 V DC, max. 110 mA, 250 Ω ≤ R _{load} ≤ 10 KΩ	
Relay		
Type	Change-over relay	
Load	42 V/2 A peak	
Functions	Error level, error number, limit, flow direction	
Digital input	11 ... 30 V DC (R _i = 13.6 kΩ)	
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output	
Galvanic isolation	All inputs and outputs are galva- nically isolated. Isolation voltage: • 500 V to supply • 50 V between outputs	
Cut-off		
Low-flow	0 ... 9.9 % of maximum flow	
Limit function	Mass flow, volume flow, fraction, density, sensor temperature	
Totalizer	Two eight-digit counters for for- ward, net or reverse flow	
Display	<ul style="list-style-type: none"> • Background illumination with alphanumeric text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 • Reverse flow indicated by nega- tive sign 	
Zero point adjustment	Via keypad or remote via digital input	
Ambient temperature		
Operation	-20 ... +50 °C (-4 ... +122 °F), max. rel. humidity 80 % at 31 °C (87.8 °F) decreasing to 50 % at 40 °C (104 °F) according to IEC/EN/UL 61010-1	
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)	
Communication	Add-on modules: HART, PROFIBUS PA and DP, Modbus RTU RS 485, DeviceNet, FOUNDATION Fieldbus H1	
Enclosure		
Material	Fibre glass reinforced polyamide	
Rating	IP67/NEMA 6	
Mechanical load	18 ... 1000 Hz random, 3.17 g RMS, in all directions, to IEC 68-2-36	
Supply voltage		
24 V version		
• Supply	18 ... 30 V DC 20 ... 30 V AC	
230 V version		
• Supply	87 ... 253 V AC, 50 ... 60 Hz	
Power consumption		
24 V DC	6 W	
24 V AC	10 VA	
230 V AC	9 VA	
Fuse		
230 V version	T 400 mA, T 250 V (IEC 127) - not replaceable by operator	
24 V version	T 1 A, T 250 V (IEC 127) - not replaceable by operator	
EMC performance		
Emission	EN/IEC 61326-1-4 (Industry)	
Immunity	EN/IEC 61326-1-2 (Industry)	
NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21	
Environment		
Environmental conditions acc. to IEC/EN/UL 61010-1:	<ul style="list-style-type: none"> • Altitude up to 2000 m • POLLUTION DEGREE 2 	
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.	
Cable glands	Two types of cable gland are available in polyamide in the fol- lowing dimensions: M20 or ½" NPT	

Flow Measurement

SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Selection and Ordering data	Article No.
SITRANS F C MASS 6000 transmitter Transmitter for wall mounting with wall mounting bracket, fibre glass reinforced polyamide (1 current output, 1 frq./pulse output, 1 relay output and connection board/PCB) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ME4110- 
Version Remote IP67/NEMA 6 enclosure	2
Supply voltage 115/230 V AC, 50 ... 60 Hz 24 V AC/DC	1 2
Display/Keypad with display	1
Serial communication No communication HART PROFIBUS PA Profile 3 PROFIBUS DP Profile 3 Modbus RTU RS 485 DeviceNet FOUNDATION Fieldbus H1	A B F G E H J
Cable glands M20 ½" NPT	1 2



Operating instructions for SITRANS F C MASS 6000 IP67

Description	Article No.
• English	A5E03071936

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.


All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Cable glands, screwed entries type in polyamide (100 °C (212 °F)) black, 2 pcs. • M20 • ½" NPT	A5E00822490 A5E00822501 
Sun lid for MASS 6000 transmitter (Frame and lid)	A5E02328485 

Add-on module

Description	Article No.
HART ¹⁾	◆ FDK:085U0226
PROFIBUS PA Profile 3 ¹⁾	FDK:085U0236
PROFIBUS DP Profile 3	FDK:085U0237
Modbus RTU RS 485	FDK:085U0234
FOUNDATION Fieldbus H1 ¹⁾	A5E02054250
DeviceNet	FDK:085U0229



¹⁾ Modules are rated Ex i when used with MASS 6000 Ex d.



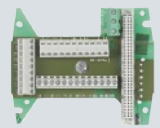
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.





Operating instructions for SITRANS F add-on modules

Description	Article No.
HART	
• English	A5E03089708
PROFIBUS PA/DP	
• English	A5E00726137
• German	A5E01026429
Modbus	
• English	A5E00753974
• German	A5E03089262
• Spanish	A5E03089278
• French	A5E03089265
FOUNDATION Fieldbus	
• English	A5E02318728
• German	A5E02488856
• Spanish	A5E02512177
• French	A5E02512169
DeviceNet	
• English	A5E03089720

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

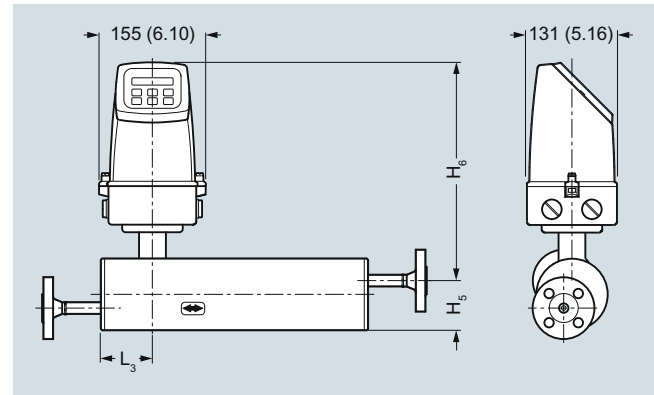
Spare parts for compact or remote IP67 version

Description	Article No.
MASS 6000 transmitter IP67/NEMA 6 Fibre glass reinforced polyamide and without connection board 1 current output 1 frq./pulse output 1 relay output • 115/230 V AC, 50/60 Hz • 24 V AC/DC	7ME4110-1AA10-1AA0 7ME4110-1AA20-1AA0 
Wall mounting unit for IP67/NEMA 6 version with wall bracket, without connection board but with • 4 x M20 cable glands • 4 x ½" NPT cable glands	FDK:085U1018 A5E01164211 
Connection board/PCB Supply voltage: 115/230 V/24 V AC/DC	FDK:083H4260 

Description	Article No.	
Terminal box kit with <ul style="list-style-type: none"> • M20 cable glands • ½" NPT cable glands Change from remote to safe area compact mounting of MASS 6000 IP67/NEMA 6 with MASS 2100. The kit consists of a terminal box in polyamide incl. connection board, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor. Not approved for hazardous locations	A5E00832338 A5E00832342	
Terminal box, in polyamide, inclusive lid <ul style="list-style-type: none"> • M20 cable glands • ½" NPT cable glands Not approved for hazardous locations	FDK:085U1050 FDK:085U1052	
Terminal box – lid in polyamide	FDK:085U1003	
Display and keypad <ul style="list-style-type: none"> • Siemens Front 	FDK:085U1039	

Dimensional drawings

Compact

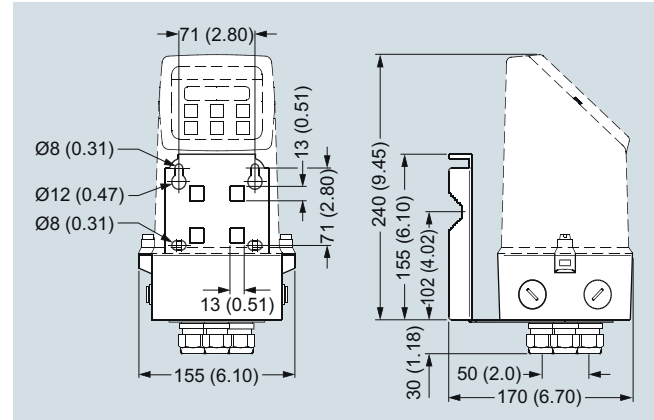


Dimensions in mm (inch)

MASS 2100

Sensor size [Di (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (1/4)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (1/2)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1 1/2)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Transmitter wall mounted



Dimensions in mm (inch)

Flow Measurement

SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Schematics

Electrical connection

Grounding

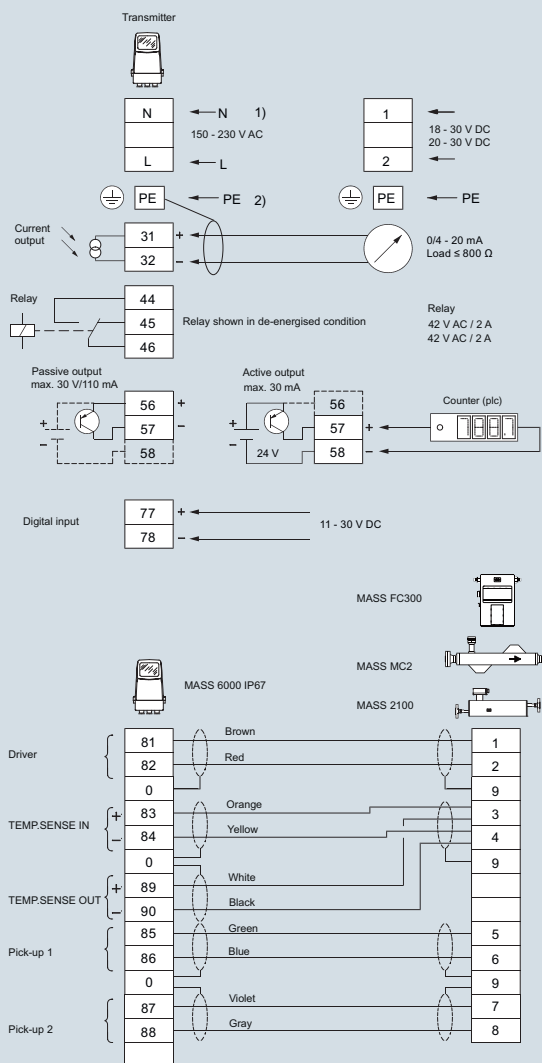
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 μ F capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If long cables are used in a noisy environment, it is recommended to use shielded cables.



3

Transmitter MASS 6000 for 19" insert/19" wall mounting

Overview



MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

The MASS 6000 19" transmitter can be connected to all sensors of types MASS 2100/MC2/FC300/FCS200 and are available in different versions depending of number of output facilities, Ex protection and grade of enclosure.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm.
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances troubleshooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as Brix or Plato
- Many output capacities, up to 3 current, 2 frequency/pulse and 2 relay outputs (excludes the possibility of an add-on module)
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Self-explaining error handling/log in text format
 - Keypad can be used for controlling batch as start/stop/hold/reset

- SENSORPROM technology automatically configures transmitter at start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type, output settings
 - Any values or settings changed by users are stored automatically
 - Automatically re-programming any new transmitter without loss of accuracy
 - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 3rd-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
 - All modules can be fitted as true "plug & play"
 - Module and transmitter automatically configured through the SENSORPROM.
- Transmitter available with ATEX and UL approval
- All electrical connections are easily accessible on the large back plane PCB

Application

SITRANS F C Coriolis mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter can measure both liquids and gases.

The main applications for the MASS 6000 19" transmitter can be found in:

- Chemical and pharmaceutical industries
- Food and beverage industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed as a 19" insert as base to be used in:

- 19" rack system
- Panel mounting IP65
- Back of panel mounting IP20
- Wall mounting IP66

The MASS 6000 19" is available as standard or as ATEX-approved transmitter which is to be mounted in the safe area.

Flow Measurement

SITRANS F C

Transmitter MASS 6000 for 19" insert/19" wall mounting

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 2 output versions available as standard:
 - 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
 - 3 current outputs, 2 frequency/pulse outputs, 2 relay outputs, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed-back
- Full service menu for effective and straight forward application and meter troubleshooting

Technical specifications

Measurement of	Mass flow [kg/s (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lb/ft ³)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0 ... 30 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 250 Ω ≤ R _{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, direction
Digital input	11 ... 30 V DC
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated. Isolation voltage: • 500 V to supply • 50 V between outputs
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow

Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	<ul style="list-style-type: none"> • Background illumination with alphanumeric text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Communication	Add-on modules: HART, PROFIBUS PA and DP, Modbus RTU RS 485, DeviceNet, FOUNDATION Fieldbus H1
Enclosure 19"	
Material	Aluminum/steel (DIN 41494)
Rating	IP20
Mechanical load	18 ... 1000 Hz random, 3.17 g RMS, in all directions, to IEC 68-2-36
Supply voltage	
24 V version	
• Supply	24 V DC/AC, 50 ... 60 Hz
• Fluctuation	18 ... 30 V DC 20 ... 30 V AC
• Power consumption	10 W I _N = 250 mA, I _{ST} = 2 A (30 ms)
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
• Power consumption	26 VA
Fuse	
230 V version	T 400 mA, T 250 V (IEC 127) - not replaceable by operator
24 V version	T 1 A, T 250 V (IEC 127) - not replaceable by operator
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W
EMC performance	
Emission	EN/IEC 61236-1-4 (Industry)
Immunity	EN/IEC 61236-1-2 (Industry)
Ex approval	[Ex ia] IIC, DEMKO 03 ATEX 135251X
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Cable	<ul style="list-style-type: none"> • Max. 300 m • C: max. 300 [pF/m]; L_C/R_C: max. 100 [μH/Ω] • The total cable capacity must be max. 200 nF.
Cable glands	The cable gland is available in polyamide, in dimension: PG 13.5

Transmitter MASS 6000 for 19" insert/19" wall mounting

Selection and Ordering data	Article No.
SITRANS F C MASS 6000 transmitter	7 ME 4 1 1 0 -
Transmitter for rack and wall mounting, incl. connection board	2 ■■■■ - ■■ A 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Enclosure	
19 inch insert IP20 (rack mount, purchase rack separately)	C
19 inch insert in IP65 (wall mount, enclosure included)	E
Output configuration	
1 current, 1 frequency, 1 relay	A
3 current, 2 frequency, 2 relay	C
Supply voltage	
115/230 V AC, 50/60 Hz	1
24 V AC/DC	2
Ex Approvals	
Standard (No Ex-approval)	0
ATEX	1
Display/Keypad	
With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output)	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
Modbus RTU RS 485	E
DeviceNet	H
FOUNDATION Fieldbus H1	J
Attention (Ex applications)!	
MC2 Ex version sensors must only be connected to MASS 6000 standard. The MASS 6000 connection board must be replaced by a connection board approved FDK:083H4294 or FDK:083H4295 (see connection boards/PCB for MASS 6000 and MC2 sensors).	

Operating instructions for SITRANS F C MASS 6000 19"

Description	Article No.
• English	A5E02944875


This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>


Accessories

Enclosure (without PCB, connection board)


Description	Article No.
IP66/NEMA 4X, wall mounting enclosure for 19" inserts (without back plates). Use with PCB A5E02559813 or A5E02559814	
• 21 TE	FDK:083F5037
• 42 TE	FDK:083F5038


Enclosure

Description	Article No.
Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	FDK:083F5030
Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	FDK:083F5031
Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 1 enclosure in aluminum	FDK:083F5032
Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminum	FDK:083F5033
Front cover (7TE) for panel mounting enclosure	FDK:083F4525


Cable glands

Description	Article No.
Cable glands, screwed entries type PG 13.5 in nickel-plated brass, 2 pcs.	FDK:083G3140
Cable glands, screwed entries type PG 13.5 in polyamide (100 °C (212 °F)) black, 2 pcs.	FDK:083G0228



Flow Measurement

SITRANS F C

Transmitter MASS 6000 for 19" insert/19" wall mounting

Add-on module

Note:

Only possible to connect to MASS 6000 versions with 1 current output.

Description	Article No.
HART (Ex-i)	FDK:085U0226
PROFIBUS PA Profile 3 (Ex-i)	FDK:085U0236
PROFIBUS DP Profile 3	FDK:085U0237
Modbus RTU RS 485	FDK:085U0234
FOUNDATION Fieldbus H1 (Ex-i)	A5E02054250
DeviceNet	FDK:085U0229



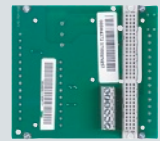
Operating instructions for SITRANS F add-on modules

Description	Article No.
HART • English	A5E03089708
PROFIBUS PA/DP • English • German	A5E00726137 A5E01026429
Modbus • English • German • Spanish • French	A5E00753974 A5E03089262 A5E03089278 A5E03089265
FOUNDATION Fieldbus • English • German • Spanish • French	A5E02318728 A5E02488856 A5E02512177 A5E02512169
DeviceNet • English	A5E03089720

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

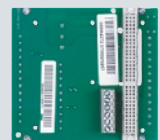
Connection boards/PCB for MASS 6000 and MASS 2100 sensors

Description	Version	Article No.
Connection board MASS 6000 for 19" IP20 rack mounting version	24 V 115/230 V	FDK:083H4272
Connection board MASS 6000 Ex [ia] IIC for 19" IP20 rack mounting version	24 V 115/230 V	FDK:083H4273
Connection board MASS 6000 for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F5038	24 V 115/230 V	FDK:083H4274
Connection board MASS 6000 Ex [ia] IIC for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F5038	24 V 115/230 V	FDK:083H4275



Connection boards/PCB for MASS 6000 and MC2 sensors

Description	Version	Article No.
Connection board MASS 6000 for 19" IP20 rack mounting version	24 V 115/230 V	FDK:083H4272
Connection board MASS 6000 for Ex application ¹⁾ and 19" IP20 rack mounting version (connection board MASS 6000 to MC2 sensors Ex-approved)	24 V 115/230 V	FDK:083H4294
Connection board MASS 6000 for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F5038	24 V 115/230 V	FDK:083H4274
Connection board MASS 6000 for Ex application ¹⁾ and 19" wall mounting version (connection board MASS 6000 to MC2 sensors Ex-approved), for enclosure FDK:083F5037/FDK:083F5038	24 V 115/230 V	FDK:083H4295






¹⁾ Attention (Ex application): MC2 Ex version sensors must only be connected to connection board FDK:083H4294 or FDK:083H4295.

Description	Article No.
Wall mounting enclosure in ABS plastic IP65 with connection board/PCB for Ex application connected to MC2 Ex sensors	FDK:083H4296



Spare parts 19" versions

Enclosure (without PCB, connection board)

Description	Article No.	
IP66/NEMA 4X, wall mounting enclosure for 19" inserts (without back plates). Use with PCB A5E02559813 or A5E02559814	FDK:083F5037	
<ul style="list-style-type: none"> • 21 TE 	FDK:083F5038	
<ul style="list-style-type: none"> • 42 TE 	FDK:085U1039	
Display unit for 19" versions Order the Display and Keypad accessory from MASS 6000 IP67 compact/remote (FDK:085U1039) and use the display for replacement		

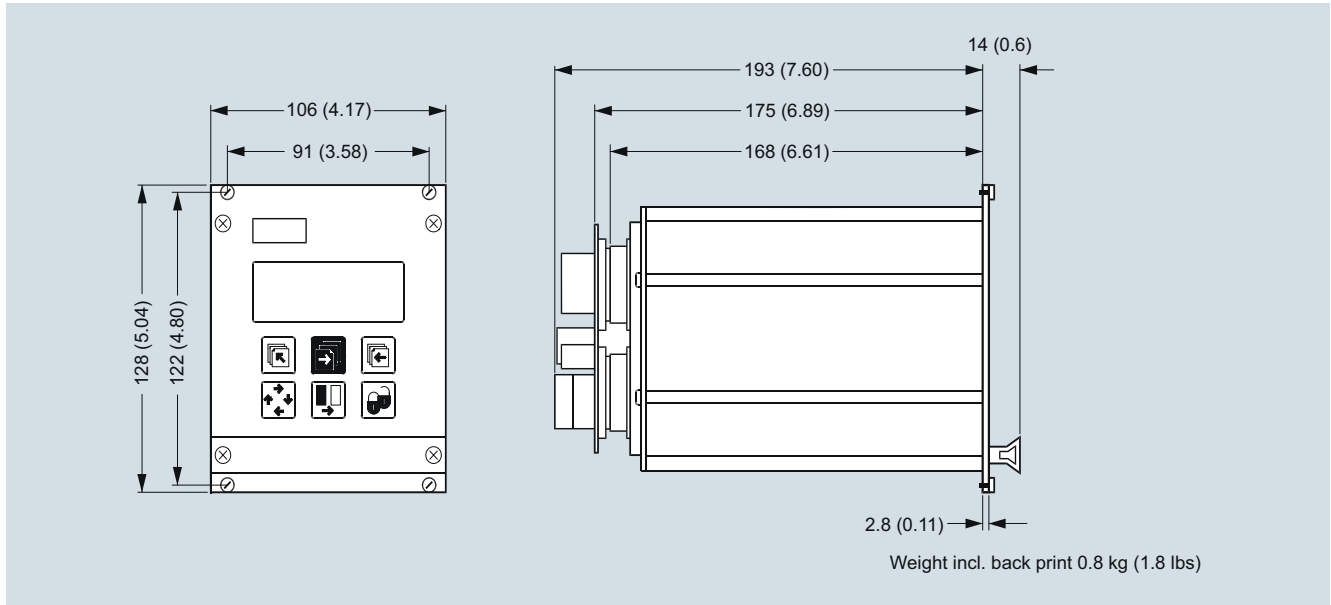
Flow Measurement

SITRANS F C

Transmitter MASS 6000 for 19" insert/19" wall mounting

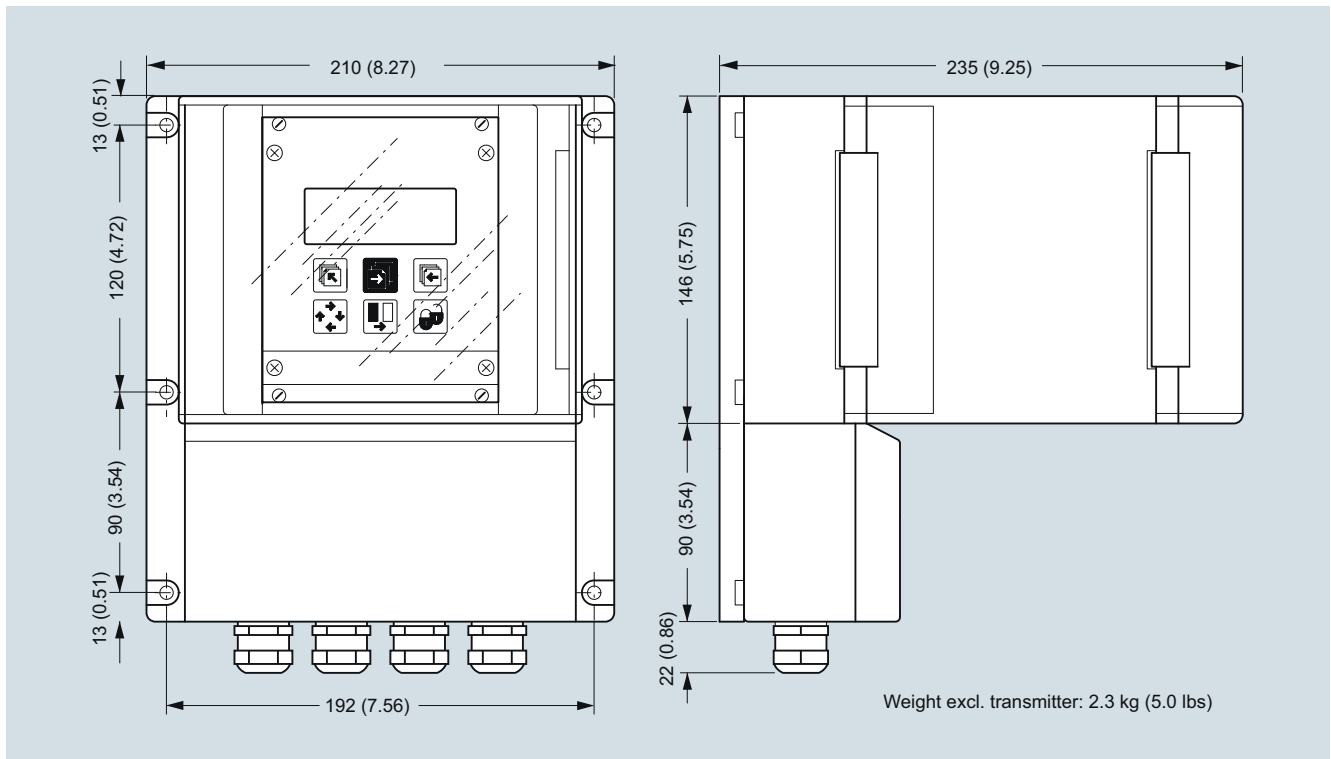
Dimensional drawings

Transmitter 19" insert



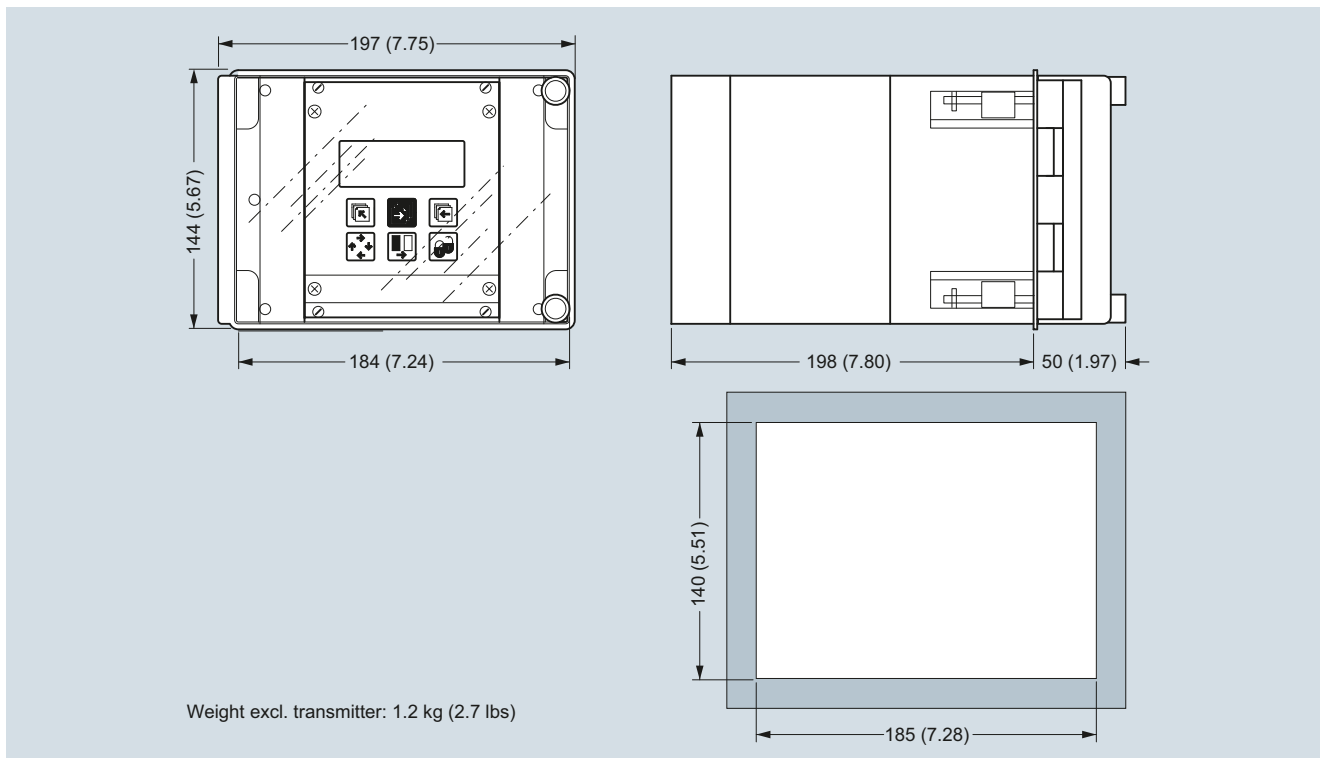
Dimensions in mm (inch)

Transmitter 19" wall mounting



Dimensions in mm (inch)

Transmitter 19" front of panel



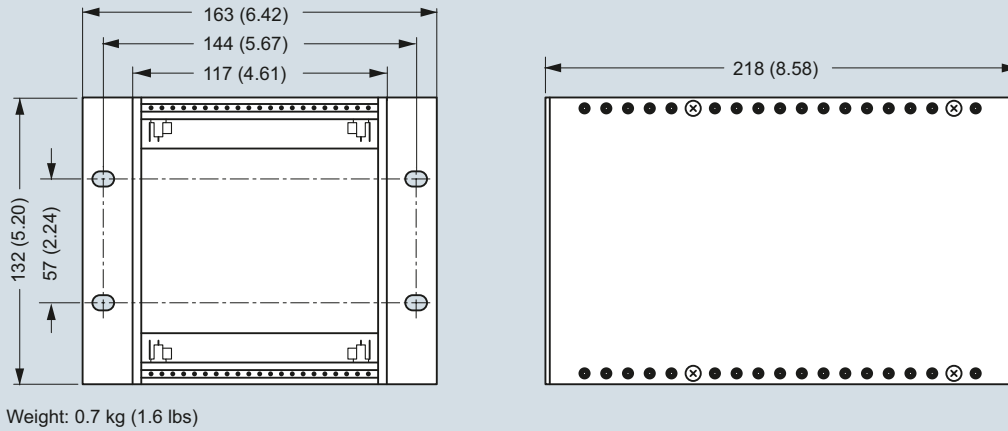
Dimensions in mm (inch)

Flow Measurement

SITRANS F C

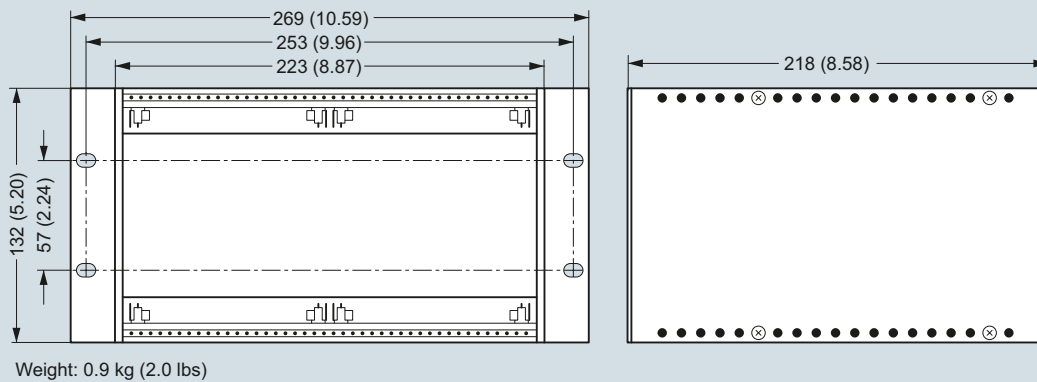
Transmitter MASS 6000 for 19" insert/19" wall mounting

Transmitter, back of panel IP20/NEMA 1, 21 TE



Dimensions in mm (inch)

Transmitter, back of panel IP20/NEMA 1, 42 TE



Dimensions in mm (inch)

Schematics

Electrical connection

Grounding

PE must be connected due to safety class 1 power supply.

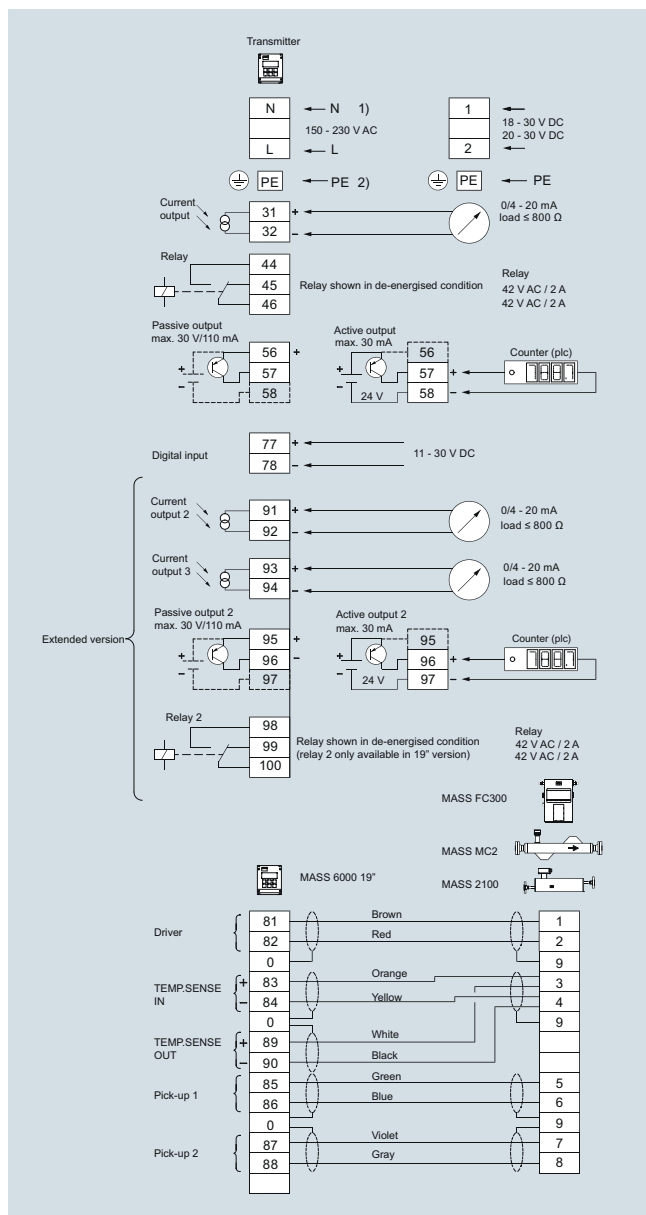
Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If long cables are used in noisy environment, it is recommended to use shielded cables.

3



Flow Measurement

SITRANS F C

Transmitter MASS 6000 Ex d compact/remote

Overview



MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction flow.

The MASS 6000 Ex d transmitter is manufactured in stainless steel (AISI 316L/1.4404) and able to withstand harsh installation conditions in hazardous applications within the process and chemical industry. The conservative choice of material guarantees the user a low cost of ownership and a long trouble-free lifetime.

The Ex d can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100. MASS 6000 Ex d cannot be combined with MC2 sensors.

Benefits

- Fully stainless steel flameproof Ex d enclosure, ensuring optimum cost of ownership
- Intrinsically safe keypad and display directly programmable in hazardous area
- ATEX-approved transmitter which can be mounted in hazardous area Zone 1 or Zone 2.
- Sensor and transmitter interface intrinsically safe Ex ia IIC
- Exchange of transmitter directly in hazardous area without shut-down of process pipe line due to ia IIC sensor/transmitter interface.
- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances troubleshooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as Brix or Plato
- 1 current output, 1 frequency/pulse and 1 relay as standard output

- Current output can be selected as passive or active output
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Self-explaining error handling/log in text format
 - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type, output settings
 - Any values or settings changed by users are stored automatically
 - Automatically re-programming any new transmitter without loss of accuracy
 - Transmitter replacement in less than 5 minutes. True "plug & play"
- Fraction flow computation based on a 3rd-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality:
 - All modules can be fitted as true "plug & play"
 - Module and transmitter automatically configured through the SENSORPROM
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all applications within the entire process industry where there is a demand for accurate flow measurement in hazardous area. The meter can measure both liquids and gases.

The main applications for the MASS 6000 Ex d transmitter can be found in:

- Chemical process industry
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry

Design

The transmitter is designed in an Ex d compact stainless steel enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40, and remote mounted for the entire sensor series except MC2.

The MASS 6000 Ex d is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

- Flameproof „d“ enclosure
- Enclosure stainless steel, IP67/NEMA 6 as compact and IP65 as remote
- Supply voltage 24 V AC/DC
- MASS 6000 Ex d is ATEX approved together with all MASS 2100 sensors, but can **not** be used together with MC2 Ex versions

Transmitter MASS 6000 Ex d compact/remote

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter troubleshooting

Technical specifications

Measurement of	Mass flow [kg/s (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lb/ft ³)], temperature [°C (°F)]
Current output	Classified Ex ia, selectable as active or passive outputs. Default setting is active mode.
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 350 Ω
Time constant	0 ... 99.9 s adjustable
Current characteristics	
Active mode	$U_o = 24 \text{ V}$, $I_o = 82 \text{ mA}$, $P_o = 0.5 \text{ W}$, $C_o = 125 \text{ nF}$, $L_o = 2.5 \text{ mH}$
Passive mode (max input from external barrier)	$U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 0.75 \text{ W}$, $C_i = 52 \text{ nF}$, $L_i = 100 \mu\text{H}$
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0.1 ... 30 s adjustable
Passive	6 ... 30 V DC, max. 110 mA, $1 \text{ k}\Omega \leq R_{\text{load}} \leq 10 \text{ k}\Omega$
Output characteristics	
Active mode	Not available
Passive mode (max input from external barrier)	$U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 0.75 \text{ W}$, $C_i = 52 \text{ nF}$, $L_i = 100 \mu\text{H}$
Relay	
Type	Change-over relay
Load	30 V/100 mA
Functionality	Error level, error number, limit, direction
Output characteristics	$U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 0.75 \text{ W}$, $C_i = 0 \text{ nF}$, $L_i = 0 \text{ mH}$

Digital input	11 ... 30 V DC ($R_i = 13.6 \text{ k}\Omega$)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Output characteristics	$U_i = 30 \text{ V}$, $I_i = 3.45 \text{ mA}$, $P_i = 0.10 \text{ W}$, $C_i = 0 \text{ nF}$, $L_i = 0 \text{ mH}$
Galvanic isolation	All inputs and outputs are galvanically isolated. Isolation voltage: • 500 V to supply • 50 V between outputs
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Empty pipe	Detection of empty sensor
Density	0 ... 2.9 g/cm ³
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumeric text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Communication	Add-on modules: HART, PROFIBUS PA, FOUNDATION Fieldbus H1
HART	
Active mode	$U_o = 6.88 \text{ V}$, $I_o = 330 \text{ mA}$, $P_o = 0.57 \text{ W}$, $C_o = 20 \text{ nF}$, $L_o = 100 \mu\text{H}$
Passive mode (max input from external barrier)	$U_i = 10 \text{ V}$, $I_i = 200 \text{ mA}$, $P_i = 0.5 \text{ W}$, $C_i = 0 \text{ nF}$, $L_i = 0 \mu\text{H}$
PROFIBUS PA	
Active mode	Not available
Passive mode	$U_i = 17.5 \text{ V}$, $I_i = 380 \text{ mA}$, $P_i = 5.32 \text{ W}$, $C_i = 5 \text{ nF}$, $L_i = 10 \mu\text{H}$
FOUNDATION Fieldbus H1	
Active mode	Not available
Passive mode	$U_i = 17.5 \text{ V}$, $I_i = 380 \text{ mA}$
Enclosure	
Material	Stainless steel AISI 316/1.4435
Rating	• Compact mounted on sensor: IP67/NEMA 4X • Remote mounted: IP65
Load	18 ... 1000 Hz random, 1.14 g RMS, in all directions, to IEC 68-2-36, Curve E

Flow Measurement

SITRANS F C

Transmitter MASS 6000 Ex d compact/remote

Supply voltage	
24 V AC	
• Range	20 ... 30 V AC
• Power consumption	6 VA $I_N = 250$ mA, $I_{ST} = 2$ A (30 ms)
• Power supply	The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm ²
24 V DC	
• Range	18 ... 30 V DC
• Power consumption	6 W $I_N = 250$ mA, $I_{ST} = 2$ A (30 ms)
• Power supply	The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm ² .
EMC performance	
Emission	EN/IEC 61326-1-4 (Industry)
Immunity	EN/IEC 61326-1-2 (Industry)
NAMUR	
	Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21
Ex approval	
	Ex de [ia/ib] IIC T6, DEMKO 03 ATEX 135253X
Temperature class:	Process liquid temperature:
• T6	• T < 85 °C (185 °F)
• T5	• 85 °C < T < 100 °C (185 °F < T < 212 °F)
• T4	• 100 °C < T < 135 °C (212 °F < T < 275 °F)
• T3	• 135 °C < T < 180 °C (275 °F < T < 356 °F)

Selection and Ordering data		Article No.
SITRANS F C MASS 6000 transmitter Transmitter Ex d for remote mounting inclusive of wall mounting kit		7 ME 4 1 1 0 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Enclosure		
Ex d SS with 5 m (16.5 ft) cable		G
Ex d SS with 10 m (32.8 ft) cable		H
Ex d SS with 25 m (82.0 ft) cable		J
Output configuration		
1 current, 1 frequency, 1 relay		A
Supply voltage		
24V AC/DC		2
Ex approvals		
ATEX		1
Display/Keypad		
With display		1
Serial communication		
No communication		
HART		A
PROFIBUS PA Profile 3		B
FOUNDATION Fieldbus H1		F
		J
Cable gland		
M20		1

Operating instructions for SITRANS F C MASS 6000 Ex d

Description	Article No.
• English	A5E02944883

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Note:

Only communication modules with Ex approvals are allowed.

Selection and Ordering data

Accessories

Add-on module for remote and compact MASS 6000 Ex d

Description	Article No.
HART (Ex-i)	FDK:085U0226
PROFIBUS PA Profile 3 (Ex-i)	FDK:085U0236
FOUNDATION Fieldbus H1 (Ex-i)	A5E02054250



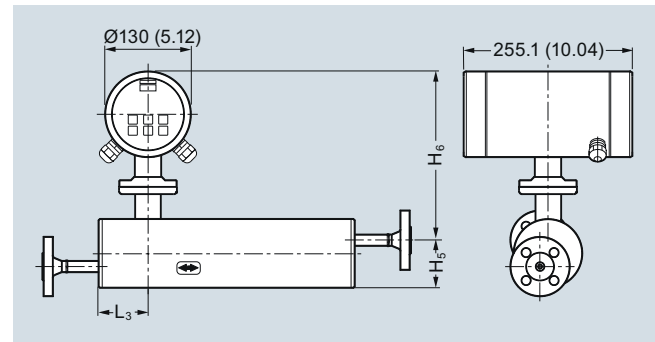
Operating instructions for SITRANS F add-on modules

Description	Article No.
HART	
• English	A5E03089708
PROFIBUS PA/DP	
• English	A5E00726137
• German	A5E01026429
FOUNDATION Fieldbus	
• English	A5E02318728
• German	A5E02488856
• Spanish	A5E02512177
• French	A5E02512169

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

Dimensional drawings

MASS 6000 Ex d compact version

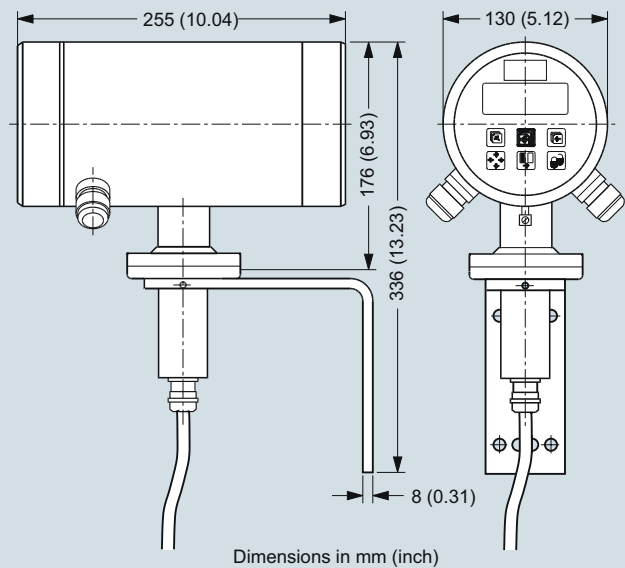
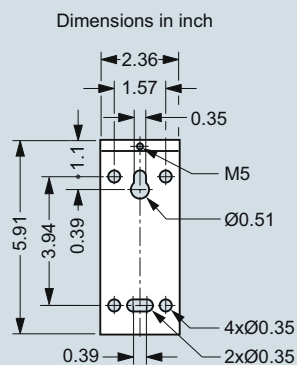
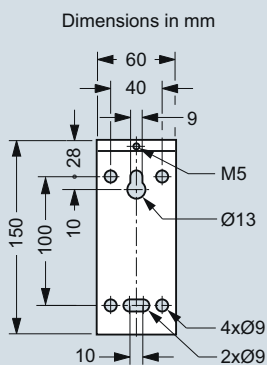


Dimensions in mm (inch)

Sensor size [Di (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (1/4)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (1/2)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	444 (17.48)
40 (1 1/2)	75 (2.95)	227 (8.94)	271 (10.67)	498 (19.61)

MASS 6000 Ex d remote version

Weight: 3 kg (6.6 lbs)



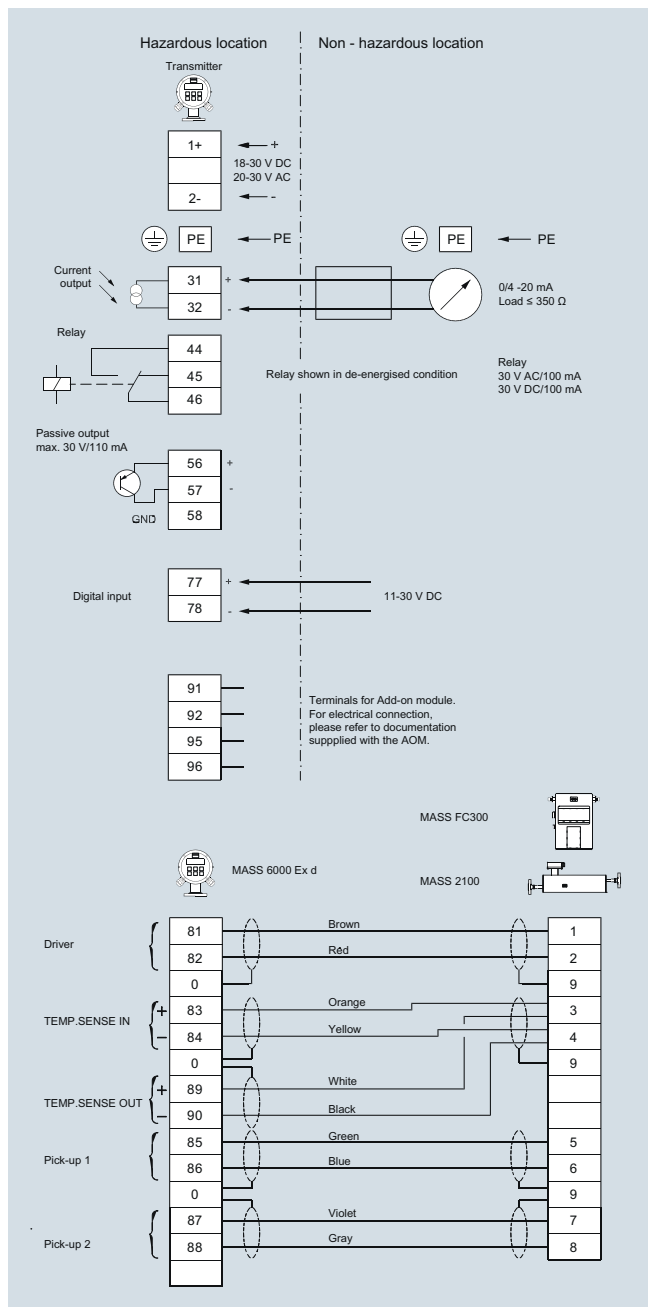
Flow Measurement

SITRANS F C

Transmitter MASS 6000 Ex d compact/remote

Schematics

Electrical connection compact or remote



3

Overview



SIFLOW FC070 is based on the latest developments within the digital processing technology – engineered for high performance, fast flow step response, immunity against process generated noise, easy to install, commission and maintain.

SIFLOW FC070 is available in two versions:

- SIFLOW FC070 Standard
- SIFLOW FC070 Ex CT

The SIFLOW FC070 transmitter delivers true multi-parameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

SIFLOW FC070 is designed for integration in a variety of automation systems, i.e.:

- Central mounted in S7-300, C7
- Decentralized in ET 200M for use with S7-300 and S7-400 as PROFIBUS DP/PROFINET masters
- Decentralized in ET 200M for use with any automation system using standardized PROFIBUS DP/PROFINET masters
- Stand-alone via a Modbus RTU master, i.e. SIMATIC PDM

The SIFLOW FC070 transmitter can be connected to all sensors of types MASS 2100, MC2, FCS200 and FC300.

Benefits

- Easy integration in SIMATIC S7 and PCS 7
- Support of SIMATIC PDM configuration tool via Modbus
- Dedicated mass flow chip with high-performance ASIC technology
- True 30 Hz update rate securing fast batching and step response
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnostics enhancing troubleshooting and meter verification
- Built-in batch controller with two-stage control and compensation
- Digital outputs for direct batch control, frequency/pulse
- Modbus RTU RS 232/RS 485 interface for connection to SIMATIC PDM or any other Modbus master

- Digital input for batch control, zero adjust
- Extensive simulation options for measurement values, I/O and errors easy communication/fault-finding
- Multiple LED's for easy indication of flow, error and I/O state
- SENSORPROM technology automatically configures the transmitter during start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type and I/O settings
 - Any values or settings changed by the user is stored automatically
 - Automatically re-programming of a new transmitter, without loss of settings and accuracy
 - Transmitter replacement in less than 30 seconds
- Four-wire Pt1000 measurement ensuring optimum accuracy mass flow, density and fraction flow
- Fraction flow computation based on a 3rd-order algorithm matching all applications
- SIFLOW FC070 Ex CT is Custody transfer approved, according to OIML R 139 (Compressed gaseous fuel measuring systems for vehicles), when using the redundant digital output or the encrypted ActiveX component for SIMATIC touch panels.
- Free of charge ActiveX component for SIMATIC touch panels, enables encrypted sensor process values to be communicated between SIFLOW FC070 Ex CT and SIMATIC touch panels

Application

SIFLOW FC070 mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meters are suitable for measuring on liquid and gas.

The main applications for the SIFLOW FC070 transmitter can be found in the following industries:

- Food and beverage
- Pharmaceutical
- Automotive
- Oil and gas
- Power generation and utility
- Water and waste water

Design

SIFLOW FC070 is designed in an IP20 SIMATIC S7-300 enclosure and for use in central and de-central cabinets where sensors: FCS200, FC300, MASS 2100 and MC2 are remotely mounted.

Function

The following key functionalities are available:

- Mass flow rate, volume flow rate, density, temperature and fraction flow
- Two built-in totalizers which can freely be set for counting mass, volume or fraction
- 1 frequency/pulse output
- 1 phase shifted 90°/180° frequency/pulse output
- Two-stage batch controller
- 1 digital input
- Low flow cut-off
- Empty pipe detection
- Noise filter settings for different applications
- Simulation
- Automatic zero point adjustment with zero point evaluation feed back
- Configurable upper and lower alarm and warning limits for all process values
- Comprehensive status and error reporting

Flow Measurement

SITRANS F C

Transmitter SIFLOW FC070

Technical specifications

Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %	Power	
Measurement functions		Supply	24 V DC nominal
• Totalizer 1	Totalization of mass flow, volume-flow, fraction A, fraction B	Tolerance	20.4 V DC ... 28.8 V DC
• Totalizer 2	Totalization of mass flow, volume-flow, fraction A, fraction B	Consumption	Max. 7.2 W
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed	Fuse	T1 A/125 V, not replaceable by operator
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached.	Environment	
Digital input		Ambient temperature	• Storage -40 ... +70 °C (-40 ... +158 °F)
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output	Operation conditions	Horizontally mounted rail. For SIFLOW FC070 Std.: 0 ... 60 °C (32 ... 140 °F) For SIFLOW FC070 Ex CT: -40 ... +60 °C (-40 ... +140 °F) Vertically mounted rail For SIFLOW FC070 Std.: 0 ... 45 °C (32 ... 113 °F) For SIFLOW FC070 Ex CT: -40 ... +45 °C (-40 ... +113 °F)
High signal	• Nominal voltage: 24 V DC • Lower limit: 15 V DC • Upper limit: 30 V DC • Current: 2 ... 15 mA	Altitude	• Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)
Low signal	• Nominal voltage: 0 V DC • Lower limit: -3 V DC • Upper limit: 5 V DC • Current: -15 ... +15 mA	Enclosure	
Input	Approx. 10 kΩ	Material	Noryl, color: anthracite
Switching	Max. 100 Hz.	Rating	IP20/NEMA 2 according to IEC 60529
Digital output 1 and 2		Mechanical load	According to SIMATIC standards (S7-300 devices)
Functions	• Output 1: Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch • Output 2: Redundancy pulse, redundancy frequency, 2-stage batch	Approvals Ex	
Voltage supply	3 ... 30 V DC (passive output)	SIFLOW FC070 Standard	CE, C-UL, ATEX II 3G Ex nA IIC
Switching current	Max. 30 mA at 30 V DC	SIFLOW FC070 Ex CT	CE, C-UL, UL Haz.Loc., FM Class I, Div. 2 Groups A, B, C, D ATEX II (1)G [Ex ia] IIC Ga / II 3G Ex nA IIC T4 Gc and IECEx Ex nA [ia] IIC T4
Voltage drop	≤ 3 V DC at max. current	Approvals Custody transfer	
Leakage current	≤ 0.4 mA at max. voltage 30 V DC	SIFLOW FC070 Ex CT	PTB Germany approval no.: 5.4.11/11.22 OIML R 139 - Compressed gaseous fuel measuring systems for vehicles
Load resistance	1 ... 10 kΩ	Electromagnetic compatibility	Requirements of EMC law; Noise immunity according to EN/IEC 61326-1 Emitted interference according to EN 55011/CISPR-11
Switching frequency	0 ... 12 kHz 50 % duty cycle	NAMUR	Within the limits according to "General recommendations" with error criteria A in accordance with NE 21
Functions	Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch	Programming tools	
Communication		SIMATIC S7	Configuration through backplane P-BUS, PLC program and WinCC flexible
Modbus RS 232C	• Max. baud rate: 115 200 baud • Max. line length: 15 m at 115 200 baud • Signal level: according to EIA-RS 232C	SIMATIC PCS7	Configuration through backplane P-BUS and PLC/WinCC faceplates, certified driver
Modbus RS 485	• Max. baud rate: 115 200 baud • Max. line length: 1200 m at 115 200 baud • Signal level: according to EIA-RS 485 • Bus termination: Integrated. Can be enabled by inserting wire jumpers.	SIMATIC PDM	Through Modbus port RS 232C and RS 485, certified driver
Galvanic isolation	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V		

Selection and Ordering data

Description	Article No.
SIFLOW FC070 flow transmitter Remember to order 40 pin front plug connector.	7ME4120-2DH20-0EA0
40 pin front plug with screw contacts	6ES7392-1AM00-0AA0
40 pin plug with spring contacts	6ES7392-1BM01-0AA0
SIFLOW FC070 Ex CT flow transmitter Remember to order 20 pin front plug connector.	7ME4120-2DH21-0EA0
20 pin plug with spring contacts	6ES7392-1BJ00-0AA0
20 pin front plug with screw contacts	6ES7392-1AJ00-0AA0






Operating instructions for SITRANS F C SIFLOW FC070

Description	Article No.
SIFLOW FC070 system manual	
• English	A5E00924779
• German	A5E00924776
SIFLOW FC070 with S7	
• English	A5E02254228
• German	A5E02665536
• French	A5E02591639
SIFLOW FC070 with PCS7	
• English	A5E03694109

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

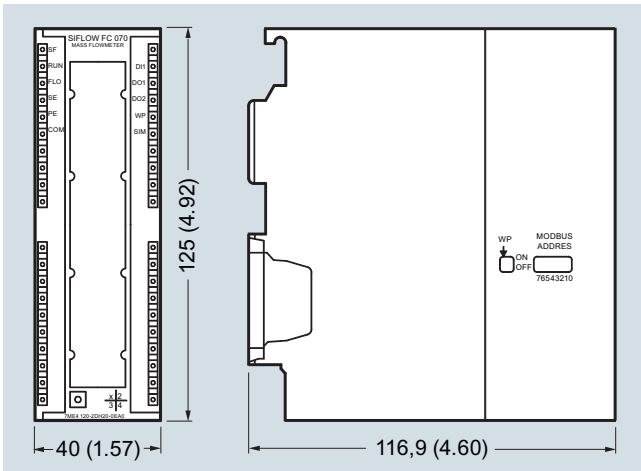
Description	Article No.
Cable with multiplug for connecting MASS 2100, FCS200 and FC300 sensors, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F)	
• 5 m (16.4 ft)	FDK:083H3015
• 10 m (32.8 ft)	FDK:083H3016
• 25 m (82 ft)	FDK:083H3017
• 50 m (164 ft)	FDK:083H3018
• 75 m (246 ft)	FDK:083H3054
• 150 m (492 ft)	FDK:083H3055
Cable without multiplug for connecting MC2 sensors, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F)	
• 10 m (32.8 ft)	FDK:083H3001
• 25 m (82 ft)	FDK:083H3002
• 75 m (246 ft)	FDK:083H3003
• 150 m (492 ft)	FDK:083H3004
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300	
• 160 mm (6.3")	6ES7390-1AB60-0AA0
• 482 mm (18.9")	6ES7390-1AE80-0AA0
• 530 mm (20.8")	6ES7390-1AF30-0AA0
• 830 mm (32.7")	6ES7390-1AJ30-0AA0
• 2000 mm (78.7")	6ES7390-1BC00-0AA0
SIFLOW FC070 Demo suitcase with MASS 2100 DI 1.5 sensor and SIMATIC HMI TP 177B touch panel	
SIMATIC S7-300, stabilized power supply PS307 Input: 120/230 V AC Output: 24 V DC/2 A	

Flow Measurement

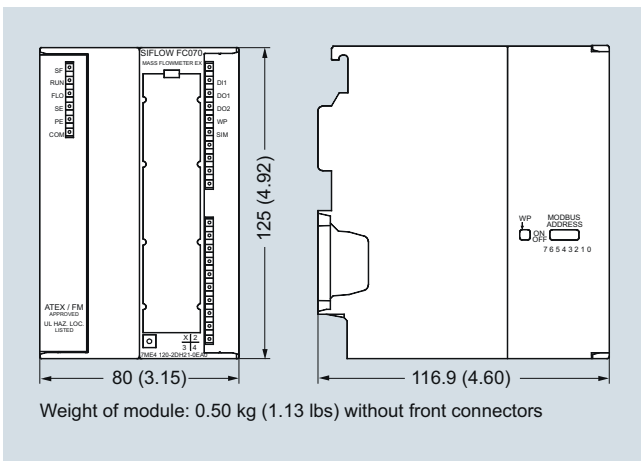
SITRANS F C

Transmitter SIFLOW FC070

Dimensional drawings



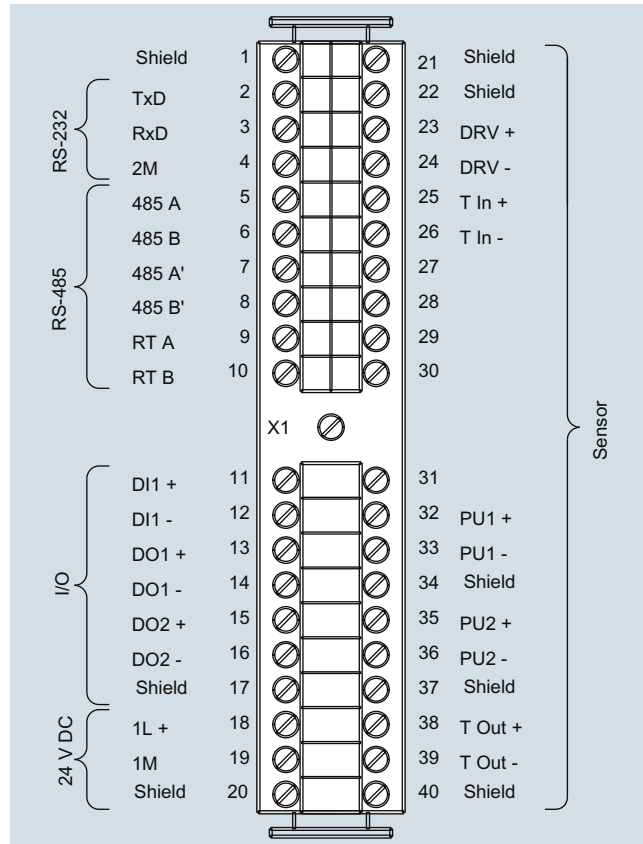
SIFLOW FC070, dimensions in mm (inch)



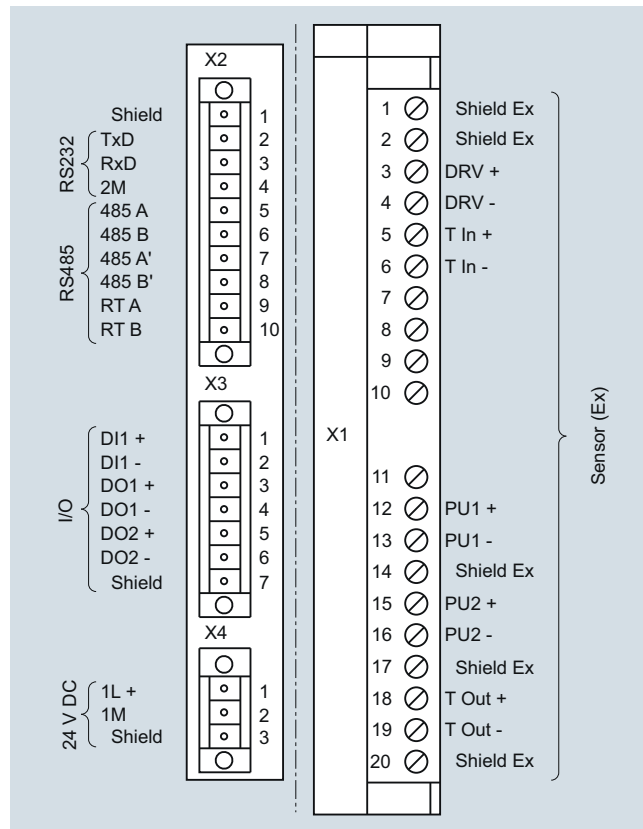
Weight of module: 0.50 kg (1.13 lbs) without front connectors

SIFLOW FC070 Ex CT, dimensions in mm (inch)

Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex CT, electrical connection

3

Overview



SITRANS FCS200 (DN10, DN 15 and DN 25) is a Coriolis sensor specialized for accurate mass flow measurement of gases.

The sensor offers superior performance in terms of flow accuracy and turn down ratio. The ultra compact sensor design makes installation, replacement and commissioning very straight forward and easy.

Benefits

- High accuracy gas measurement
- Approved for use in hazardous area
- DN 10 and DN 15 is custody transfer approved, according to OIML R 139 (Compressed gaseous fuel measuring systems for vehicles). For custody transfer applications SIFLOW FC070 Ex CT must be used.
- Self-draining in vertical orientation
- Pt1000 temperature measurement for optimum accuracy
- SENSORPROM enabling true "plug & play"
- Rigid enclosure design reducing influence from pipeline vibration and thermal stress
- High-pressure measurement up to 350 bar (5076 psi)
- Ultra compact sensor design with space-saving split flow

Application

SITRANS FCS200 is designed for measurement of gases and is suitable for use in the oil and gas industry:

- Filling of gas bottles
- CNG dispensers
- Metering of general gas applications

Design

SITRANS FCS200 is available in DN 10, DN 15 and DN 25.

The sensor consists of 2 parallel measuring pipes, welded directly onto a flow splitter at each end of the sensor to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations. The flow-splitters are welded directly onto a rigid sensor housing which acts as a mechanical low pass filter.

The SITRANS FCS200 DN 10 and DN 15 wetted parts material is Hastelloy C22, and the DN 25 wetted parts material is AISI 316Ti/1.4571. The enclosure is made of stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP67.

The two black rupture discs are designed to protect the enclosure from overpressure.

Function

The flow measuring principle is based on the Coriolis effect. See "System information SITRANS F C".

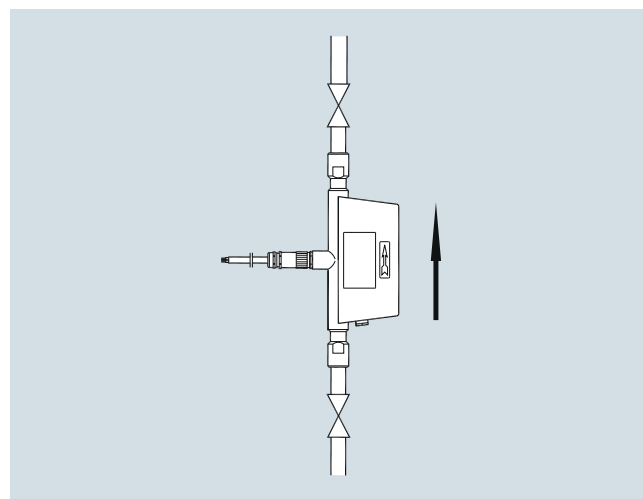
Integration

The complete flowmeter consists of the sensor (SITRANS FCS200) and a transmitter SITRANS F C MASS 6000 or SIFLOW FC070. All communication options are available for MASS 6000.

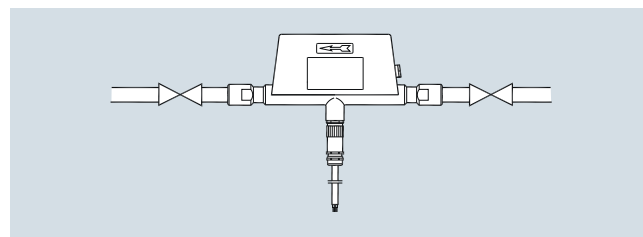
The sensor is shipped with a SENSORPROM memory unit containing all information about calibration data, device identity and factory pre-programming of transmitter settings.

Installation guidelines

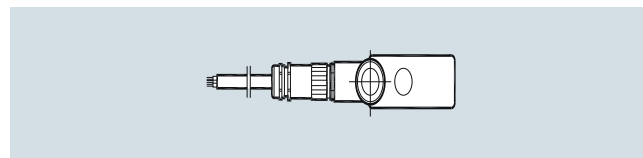
Siemens Flow Instruments recommends installing the sensor in one of the following ways:



Vertical orientation with an upwards flow



Horizontal installation, tubes up



Horizontal installation, tubes sideways

Flow Measurement

SITRANS F C

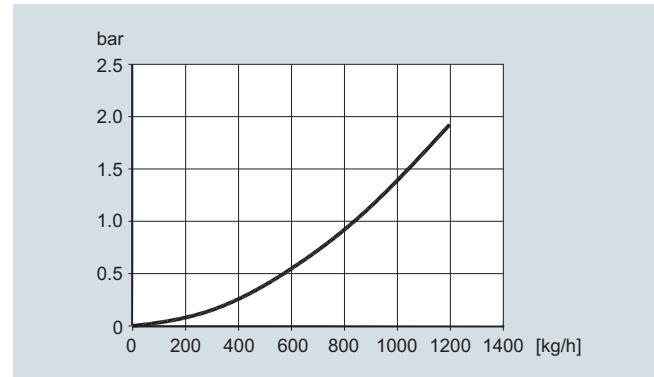
Flow sensor SITRANS FCS200

Technical specifications

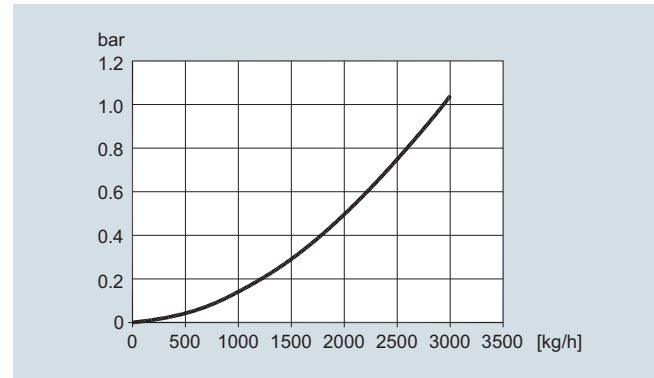
Sensor size	DN 10	DN 15	DN 25
Mass Flow			
Accuracy [% of rate]		± 0.5	
Repeatability [% of rate]		± 0.25	
Max. zero point error [kg/h (lb/h)]	0.25 (0.55)	1.2 (2.65)	3.0 (6.6)
Measuring range [kg/min (lb/min)]	0 ... 42 (0 ... 92.6)	0 ... 200 (0 ... 440.9)	0 ... 500 (0 ... 1102.3)
Process temperature	-40 ... +125 °C (-40 ... +257 °F)		
Ambient temperature	-40 ... +60 °C (-40 ... +140 °F)		
Temperature error	0.5 °C (0.9 °F)		
Pressure [bar (psi)]	350 (5076)	350 (5076)	214 (3104)
Enclosure grade	IP66/IP67 (EN 60529)		
Material			
Measuring pipe	Hastelloy C22/2.4602	Hastelloy C22/2.4602	Stainless steel AISI 316L/1.4571
Splitter	Hastelloy C22/2.4602	Stainless steel AISI 316L/1.4571	Stainless steel AISI 316L/1.4571
Enclosure and connection (flanges)	Stainless steel		
Connection thread	¼" NPT ½" NPT ½" VCO	½" NPT ¾" NPT 1" NPT ¾" VCO	1" NPT 1½" NPT 1" VCO
Ex approval	II 1/2 G Ex ia IIC T5/T4 Ga/Gb		
• ATEX	Ex ia IIC T5/T4 Ga/Gb		
• IECEx	Class I, Div 1, Groups A, B, C and D		
• FM			
Weight approx.	2.8 kg (6.2 lb)	6.0 kg (13.2 lb)	11 kg (24.2 lb)
Approvals Custody transfer			
DN 10/DN 15	PTB Germany approval nr: 5.4.11/11.22 OIML R 139 - Compressed gaseous fuel measuring systems for vehicles		

Characteristic curves

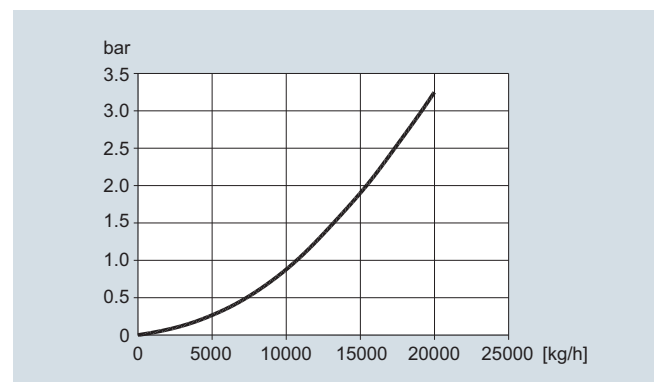
DN 10



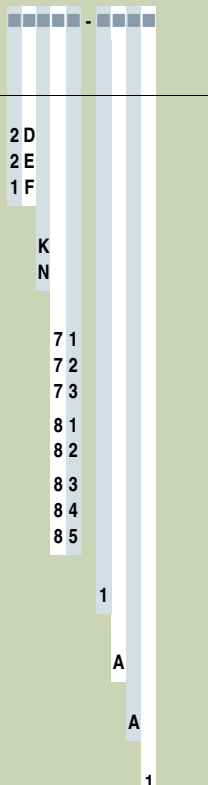
DN 15



DN 25



The pressure drop as a function of capacity for CNG with a pressure of 200 bar (2900 psi) and an ambient temperature of 20 °C (68 °F).

Selection and Ordering data	Article No.
SITRANS F C Flow sensors	
SITRANS FCS200 sensor, without heating jacket	7ME4500 -
<p>↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	
Sensor size and material	
DN 10, Hastelloy C22/2.4602	2 D
DN 15, Hastelloy C22/2.4602	2 E
DN 25, Stainless steel AISI 316Ti/1.4571	1 F
Pressure	
PN 214 (DN 25)	K
PN 350 (DN 10 and DN 15)	N
Process connection/flange	
1/2" VCO	7 1
3/4" VCO	7 2
1" VCO	7 3
1/4" NPT pipe thread	8 1
1/2" NPT pipe thread	8 2
3/4" NPT pipe thread	8 3
1" NPT pipe thread	8 4
1 1/2" NPT pipe thread	8 5
Configuration	
Standard	1
Transmitter	
None	A
Cable	
No cable	A
Calibration	
Standard calibration	1

Operating instructions for SITRANS FCS200

Description	Article No.
• English	A5E02508199
• German	A5E03082574
• Spanish	A5E03082587
• French	A5E03082581
• Italian	A5E03504933

Spare parts

Description	Article No.
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-3.1	C12
NDT-Penetrant inspection report ISO 3452	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17

Accessories

Description	Article No.
Cable with multiple plug	
5 m (16.4 ft)	FDK:083H3015
Standard blue cable between SIFLOW FC070/MASS 6000 and FCS200.	10 m (32.8 ft) FDK:083H3016
25 m (82 ft)	FDK:083H3017
5 x 2 x 0.34 mm ² twisted and screened in pairs.	50 m (164 ft) FDK:083H3018
Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	75 m (246 ft) FDK:083H3054
	150 m (492 ft) FDK:083H3055

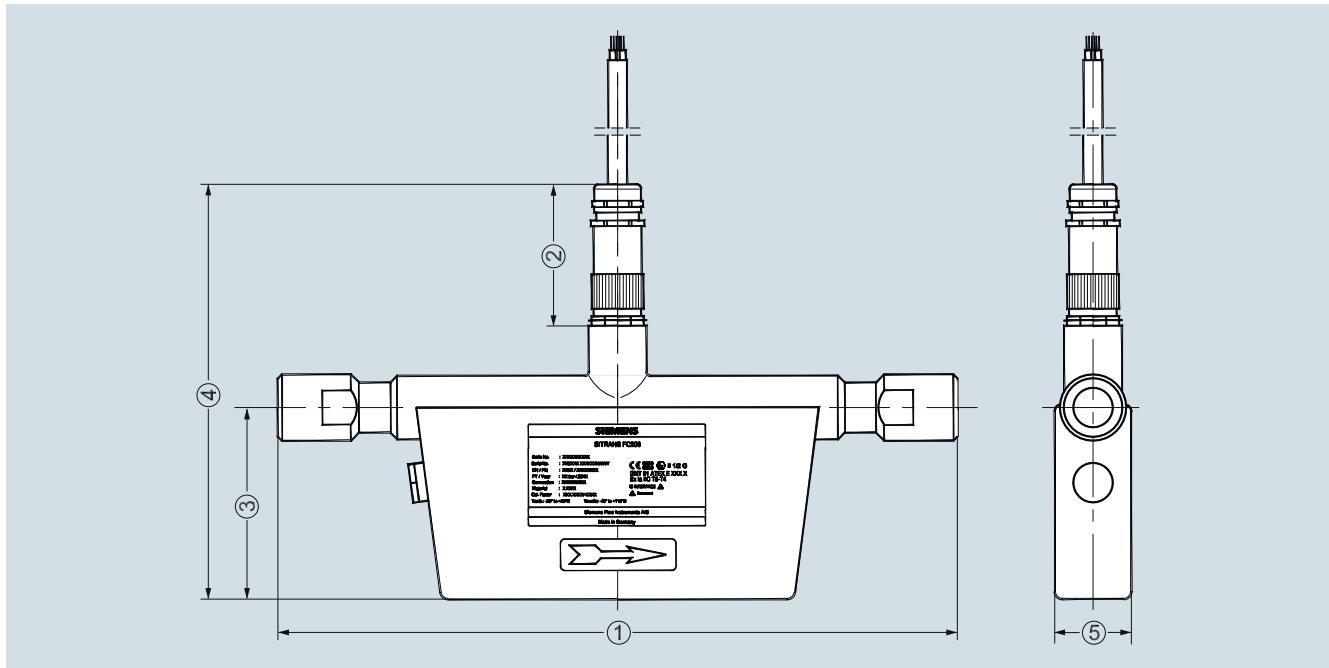
Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS200

Dimensional drawings

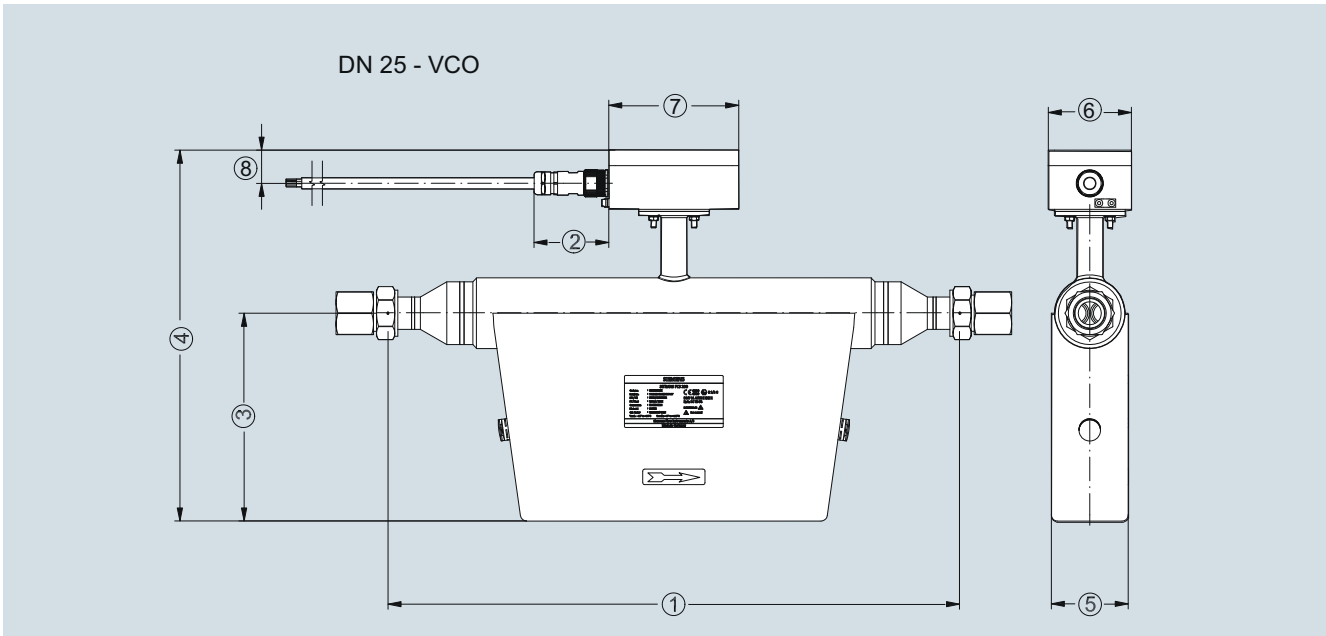
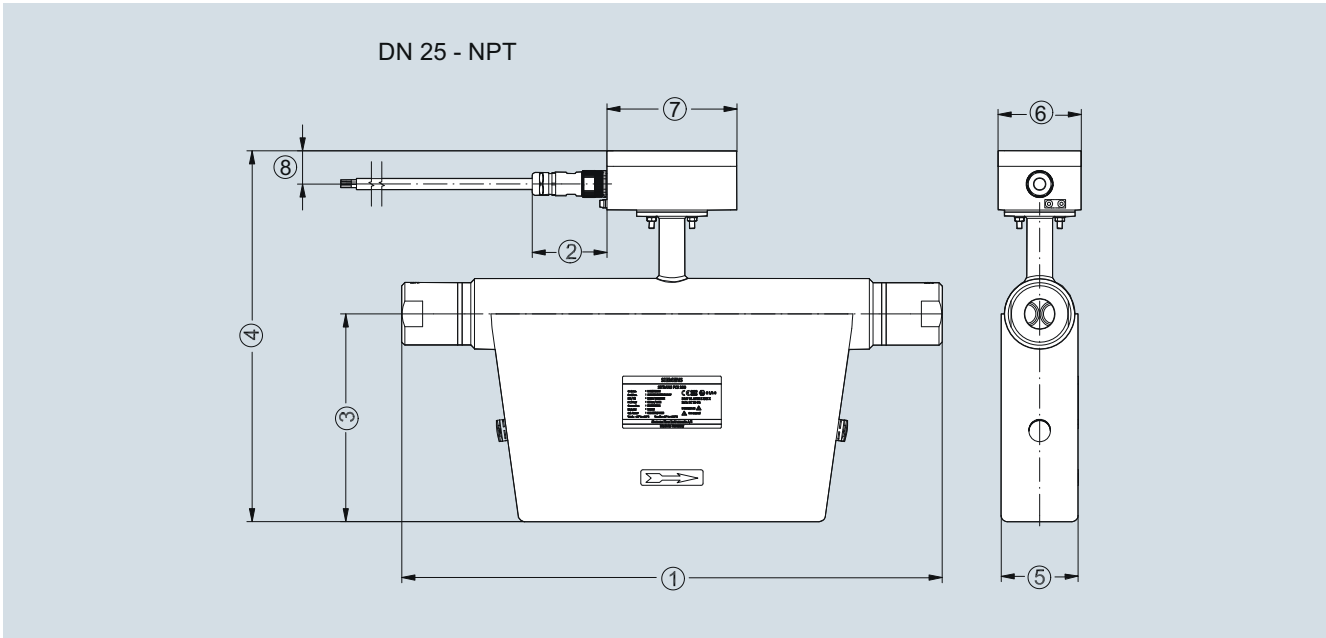
SITRANS FCS200, DN 10 ... DN 15



SITRANS FCS200, DN 10 ... DN 15, dimensions in mm (inch)

Position	DN 10 with NPT connectors mm (inch)	DN 10 with VCO connectors mm (inch)	DN 15 mm (inch)
(1)	350 (13.78)	330 (12.99)	450 (17.72)
(2)	72 (2.84)	72 (2.84)	72 (2.84)
(3)	100 (3.94)	100 (3.94)	148 (5.83)
(4)	204 (8.03)	204 (8.03)	253 (9.96)
(5)	40 (1.57)	40 (1.57)	48 (1.89)

SITRANS FCS200, DN 25



SITRANS FCS200, DN 25, dimensions in mm (inch)

Position	DN 25 with NPT connection mm (inch)	DN 25 with VCO connection mm (inch)
(1)	520 (20.47)	550 (21.65)
(2)	72 (2.84)	72 (2.84)
(3)	200 (7.87)	200 (7.87)
(4)	357 (14.77)	357 (14.77)
(5)	74 (2.91)	74 (2.91)
(6)	80 (3.15)	80 (3.15)
(7)	125 (4.92)	125 (4.92)
(8)	32 (1.26)	32 (1.26)

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 1.5

Overview



MASS 2100 DI 1.5 is suitable for low flow measurement applications of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi-parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1, from 30 kg/h to a few g/h
- Densitometer performance available through a density accuracy better than 0.001 g/cm³ with a repeatability better than 0.0002 g/cm³.
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications.
- Market's biggest wall thickness, ensuring optimal life-time and corrosion resistance and high-pressure durability
- Balanced pipe design with little mechanical energy-loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density-changes etc.).
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 minutes
- Intrinsically safe Ex ia design as standard
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Dual-drive pick-up and driver construction facilitate ultra low-weight pipe construction giving the markets' smallest and most stable zero point.
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement.

Application

In many industries such as the food and beverage or pharmaceutical industry, accurate recipe control means everything. The MASS 2100 DI 1.5 has demonstrated superior performance in numerous applications and field trials relating to accuracy and turn-down ratio. It is today the preferred meter for research and development and mini-plant applications for liquid or gas measurement, where measuring small quantities is important.

The main applications for the MASS 2100 DI 1.5 sensor can be found in:

Chemical industry	Liquid and gas measurement within Miniplant and R & D, dosing of additives and catalysts
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Dosing of flavourings, colours and additives, density measurement, inline measurement of liquid or gaseous CO ₂
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The MASS 2100 sensor consists of a single bent tube in a double omega pipe configuration, welded directly to the process connectors at each end.

The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with 1/4" NPT or 1/4" ISO process connections.

The enclosure is made in stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP65/NEMA 4.

The sensor is available in either a standard version with a maximum liquid temperature of 125 °C (257 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The enclosed single quick release clamp fitting which, along with its compact design and single multi-plug electrical connector, will keep installation costs and time to a minimum as shown below.



Function

The measuring principle is based on the Coriolis effect. See "System information SITRANS F C Coriolis mass flowmeters".

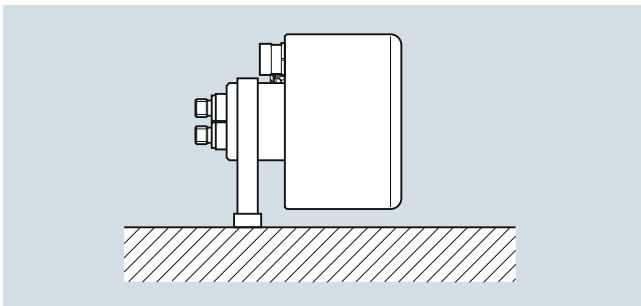
Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

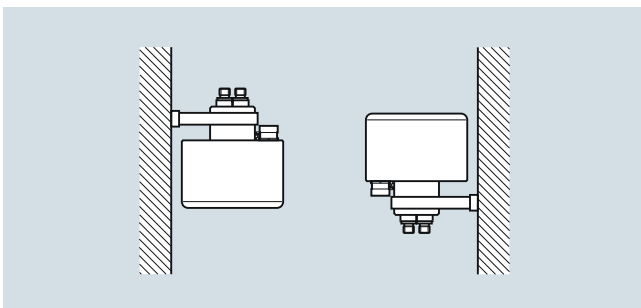
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines MASS 2100 DI 1.5 (1/16")Installation of MASS 2100 sensor

- The optimal installation is horizontal.
If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s.
If there are solid particles in the liquid, especially in connection with low flow, it is recommended that the sensor be mounted horizontally with inlet flange uppermost so that particles are more easily flushed out. To ensure that the sensor does not become partially empty, there must be sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi).
- Mount the sensor on a vibration-free wall or steel frame.
- Locate the sensor low in the system in order to avoid an under-pressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal

Liquid and gas application

Vertical

Liquid application (left), gas application (right)

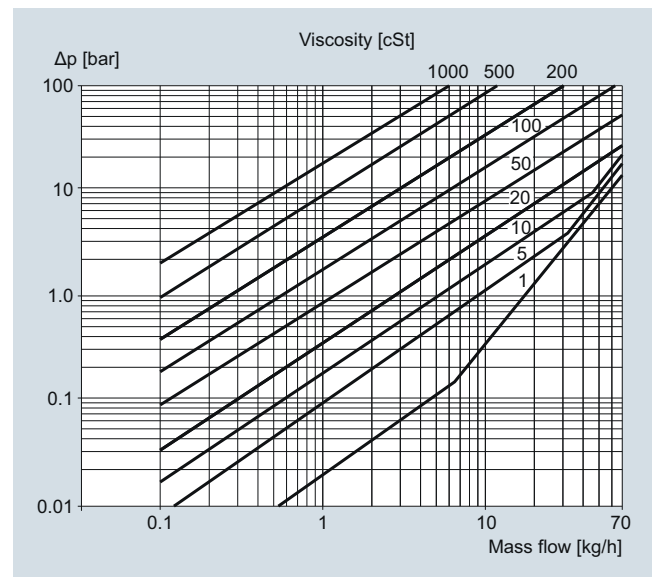
Technical specifications

Inside pipe diameter (sensor consists of one continuous pipe)	1.5 mm (0.06")
Pipe wall thickness	0.25 mm (0.010")
Mass flow measuring range	0 ... 30 kg/h (0 ... 66 lb/h)
Density	0 ... 2.9 g/cm ³ (0 ... 0.10 lb/inch ³)
Fraction e.g.	0 ... 100 °Brix
Temperature	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High-temperature version	-50 ... +180 °C (-58 ... +356 °F)
Liquid pressure measuring pipe¹⁾	
Stainless steel	230 bar (3336 psi) at 20 °C (68 °F)
Hastelloy C22/2.4602	365 bar (5294 psi) at 20 °C (68 °F)
Materials	
Measuring pipe and connection	Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602
Enclosure and enclosure material²⁾	IP65 and stainless steel AISI316L/1.4404
Connection thread	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" NPT male
Cable connection	Multiple plug connection to sensor 5 x 2 x 0.35 mm ² twisted and screened in pairs, ext. Ø 12 mm
Ex-version	II 1G Eex ia IIC T3-T6, DEMKO 03 ATEX 135252X c-UL-us Ex ia IIC T3-T6 UL WYMG.E232147
Weight approx.	2.6 kg (5.73 lb)

¹⁾ According to DIN 2413, DIN 17457

²⁾ Housing is not rated for pressure containment.

For accuracy specifications see "System information SITRANS F C".

Pressure dropMASS 2100 DI 1.5 (1/16"), pressure drop for density = 1000 kg/m³

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 1.5

Selection and Ordering data	Article No.	Ord. code
SITRANS F C Flow sensors	7ME4100-	
MASS 2100 DI 1.5 (1/16") sensor		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Diameter		
Stainless steel AISI 316L/1.4435	1 A	
DI 1.5, max. 125 °C (257 °F)	1 B	
DI 1.5, max. 180 °C (356 °F)		
Hastelloy C22/2.4602	2 A	
DI 1.5, max. 125 °C (257 °F)	2 B	
DI 1.5, max. 180 °C (356 °F)		
Pressure		
PN 100	D	
PN 230 (AISI 316L/1.4404)	L	
PN 365 (C22/2.4602)	P	
Process connection/flange		
Pipe thread		
G 1/4" male	10	
1/4" NPT male	11	
Configuration		
Standard		1
Density		2
Brix/Plato		3
Fraction (specification required)		9
Transmitter compact mounted on sensor		
No transmitter, sensor and adapter only		A
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with Ex de [ia/ib] T3 -T6 Ex-approval.		B
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC.		C
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz		D
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC		E
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, 1/2" NPT		F
Cable		
No cable		A
5 m (16.4 ft) cable		B
10 m (32.8 ft) cable		C
25 m (82 ft) cable		D
50 m (164 ft) cable		E
75 m (246 ft) cable		F
150 m (492 ft) cable		G
Calibration		
Standard calibration 3 flow x 2 points		1
Standard calibration matched pair 3 flow x 2 points		2
Accredited calibration matched pair 5 flow x 2 points (DANAK)		3
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)		8

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-3.1	C12
Welding certificate NDT-Penetrant: ISO 3452	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17
Tag name plate, plastic	Y18
Customer-specific transmitter setup	Y20
Customer-specified, matched pair (5 x 2)	Y60
Customer-specified calibration (5 x 2)	Y61
Customer-specified, matched pair (10 x 1)	Y62
Customer-specified calibration (10 x 1)	Y63
Cleaned for oil and grease	Y80
Special version	Y99

Operating instructions for SITRANS F C MASS 2100 DI 1.5

Description	Article No.
• English	A5E03089952
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.	
All literature is also available for free at: http://www.siemens.com/flowdocumentation	

Accessories

Description	Article No.
Cable with multiple plug Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	
• 5 m (16.4 ft)	FDK:083H3015
• 10 m (32.8 ft)	FDK:083H3016
• 25 m (82 ft)	FDK:083H3017
• 50 m (164 ft)	FDK:083H3018
• 75 m (246 ft)	FDK:083H3054
• 150 m (492 ft)	FDK:083H3055



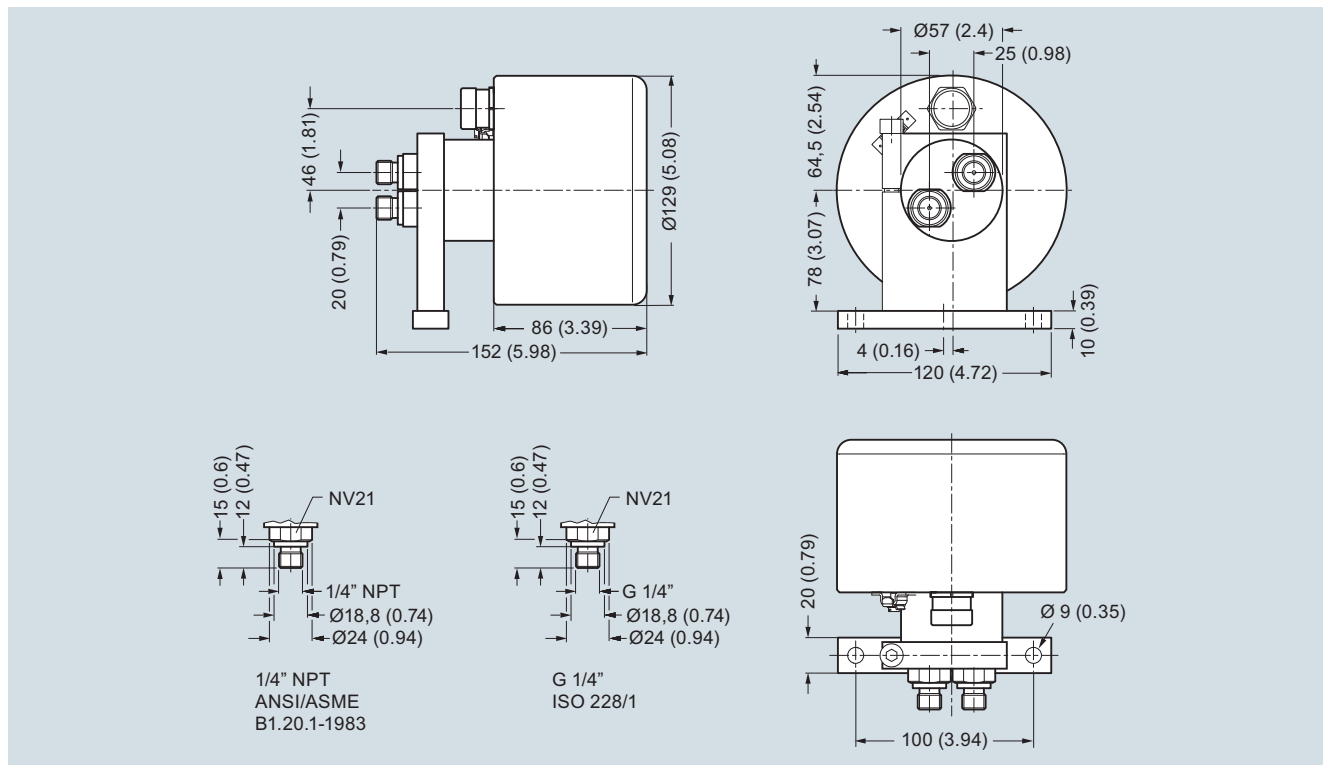
Spare parts

Description	Article No.
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410
Bracket	A5E02590427



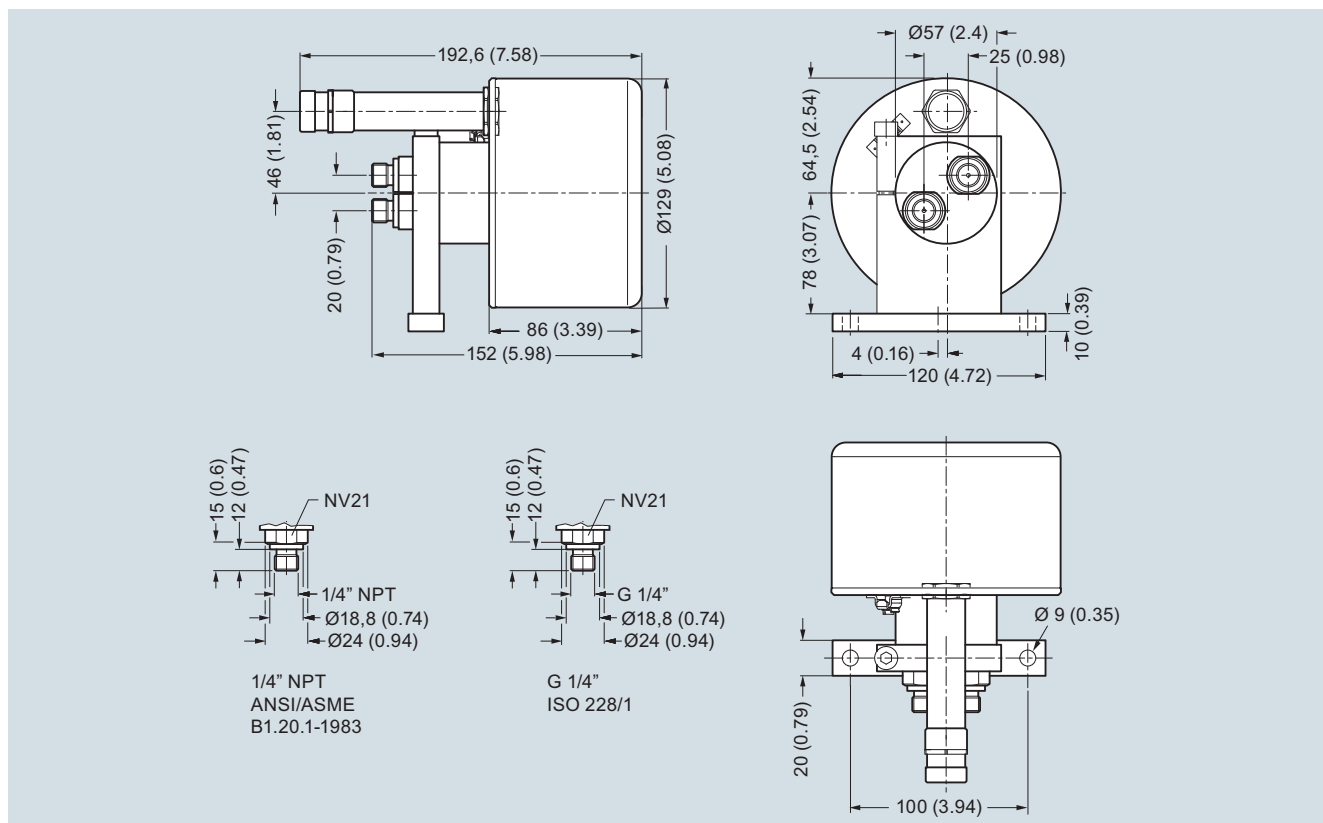
Dimensional drawings

MASS 2100 DI 1.5 (1/16")



Dimensions in mm (inch)

MASS 2100 DI 1.5 High-temperature version to 180 °C (356 °F)



Dimensions in mm (inch)

Flow Measurement

SITRANS F C

Flow sensor SITRANS FC300

Overview



SITRANS FC300 is a compact Coriolis mass sensor suitable for flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a „plug & play“ interface ensures optimum performance and operation.

A new designed encapsulation in stainless steel with a surprisingly low weight of only 3.5 kg (7.7 lb), ensures a rigid and robust sensor performance for a wide range of applications.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through a density accuracy as follows:
 - For 316L/1.4404 version better than 0.0015 g/cm³ (0.000036 lb/inch³) with repeatability better than 0.0002 g/cm³ (0.0000072 lb/inch³)
 - For C22/2.4602 version better than 0.0025 g/cm³ (0.000090 lb/inch³) with repeatability better than 0.001 g/cm³ (0.000036 lb/inch³)
- One tube without internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Larger wall thickness, ensures optimal life-time and corrosion resistance and high-pressure durability
- Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density-changes etc.).
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enable true „plug & play“. Installation and commissioning in less than 10 minutes.
- Intrinsically safe Ex design ia IIC as standard
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance.
- Rugged and space-saving sensor design in stainless steel matching all applications.

- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement.

Application

The industry today has an increasing demand for mass flowmeters with a reduced physical size without loss of performance. The meters must be suitable for installation in traditional process industry environment as well as OEM equipment for instance within automotive or appliance industry. Independent of industry application the meter must deliver accurate and reliable measurements. The new and versatile design of the FC300 offers this flexibility.

The main applications for the SITRANS FC300 DN 4 can be found in:

Chemical industry	Liquid and gas measurement in normal as well as corrosive environments
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Filling, dosing of flavorings, colors and additives, inline density measurement Measurement and dosing of liquid or gaseous CO ₂
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The FC300 sensor consists of a single tube bent in double omega pipe geometry, welded directly to the process connectors at each end. The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with 1/4"-NPT or G1/4"-ISO process connections.

The enclosure is made of stainless steel AISI 316L/1.4409 with a grade of encapsulation of IP67/NEMA 4. The enclosure has a very robust design and with an overall size of 130 x 200 x 60 mm (5.12" x 7.87" x 2.36") the sensor is very compact and requires only little installation space.

The sensor can be delivered in a standard version with a maximum liquid temperature of 115 °C (239 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The sensor can be mounted directly on any given plane surface or if desired with the enclosed quick release clamp fitting which, along with its compact design and multi-plug electrical connector, will keep installation costs and time to a minimum.

Function

The measuring principle is based on the Coriolis effect. See "System information SITRANS F C Coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 and SIFLOW FC070 (standard and Ex types) transmitters for remote installation only.

All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines for SITRANS FC300 sensor

Horizontal installation as shown in figure A is recommended with gas or liquid applications.

This installation is also recommended when the flow velocity is low (< 1 m/s) or the liquid contains solid particles or air bubbles.

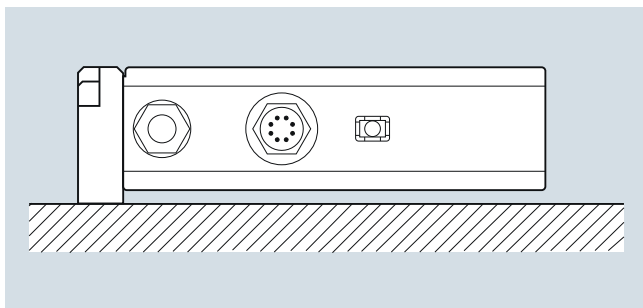
Vertical installation as shown in figure B can be used for liquid or gas applications.

For liquid applications upwards flow is recommended to facilitate the removal of air bubbles and to avoid partly emptying of the sensor.

For gas applications we recommend to place the flow inlet on the sensor high and the outlet low to remove impurities and oil films.

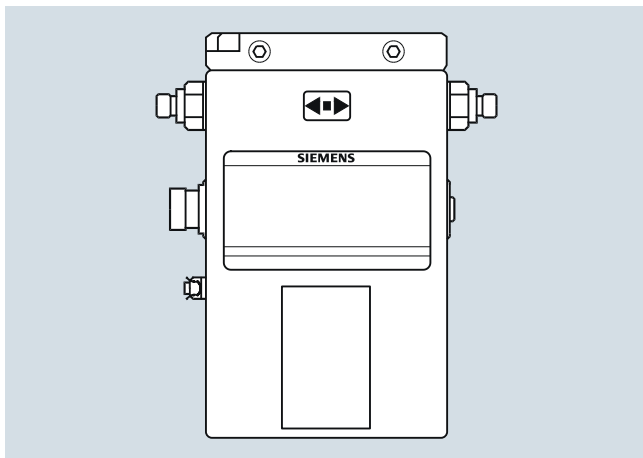
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi).
- Mount the sensor on a vibration-free and plane wall or steel frame.
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal mounting (recommended) (fig. A)



Liquid or gas (low to high flow)

Vertical mounting (fig. B)



Liquid or gas (medium to high flow)

Technical specifications

Sensor size	DN 4 (1/6")
Mass flow	
Measuring range	0 ... 350 kg/h (0 ... 772 lb/h)
Accuracy, mass flow	0.1 % of rate
Repeatability	0.05 % of rate
Max. zero point error	0.010 kg/h (0.022 lb/h)
Density	
Density range	0 ... 2.9 g/cm ³ (0 ... 0.105 lb/inch ³)
Density error	
• Stainless steel	0.007 g/cm ³ (0.00025 lb/inch ³)
• Hastelloy C22/2.4602	0.0025 g/cm ³ (0.00009 lb/inch ³)
Repeatability error	0.0002 g/cm ³ (0.0000072 lb/inch ³)
Temperature	
Standard	-40 ... +115 °C (-40 ... +239 °F)
High-temperature version	-40 ... +180 °C (-40 ... +356 °F)
Temperature error	0.5 °C (0.9 °F)
Brix	
Measuring range	0 ... 100 °Brix
Brix error	0.3 °Brix
Inside pipe diameter	
Stainless steel version	3.5 mm (0.14")
Hastelloy version	3.0 mm (0.12")
Pipe wall thickness	
Stainless steel version	0.25 mm (0.0098")
Hastelloy version	0.5 mm (0.0196")
Liquid pressure measuring pipe¹⁾	
Stainless steel	130 bar (1885 psi) at 20 °C (68 °F)
Hastelloy C22/2.4602	410 bar (5945 psi) at 20 °C (68 °F)
Materials	Stainless steel AISI 316L/1.4435
Measuring pipe and connection	Hastelloy C22/2.4602
Enclosure²⁾	
Material	Stainless steel AISI 316L/1.4404
Enclosure grade	IP67/NEMA4
Connection thread	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" NPT male
Ex approval	Ex ia IIC T3-T6 05ATEX138072X c-UL-us Class 1 Div. 1, Gr. A, B, C, D
Weight	3.5 kg (7.7 lb)
Dimensions	135 x 205 x 58 mm (5.31" x 8.07" x 2.28")

¹⁾ According to DIN 2413, DIN 17457

²⁾ Housing is not rated for pressure containment.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FC300

Selection and Ordering data	Article No.	Order code
SITRANS F C Flow sensors	7ME4400-	
SITRANS FC300 DN 4 (1/6") sensor		
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Pipe material and temperature		
Stainless steel AISI 316L/1.4435	1 G	
115 °C (239 °F)	1 H	
180 °C (356 °F)		
Hastelloy C22/2.4602	2 G	
115 °C (239 °F)	2 H	
180 °C (356 °F)		
Pressure		
PN 100	D	
PN 130 (316L/C22)	G	
PN 410 (C22)	Q	
Process connection		
Pipe thread		
G 1/4" male	1 0	
1/4" NPT male	1 1	
Configuration		
Standard	1	
Density	2	
Brix/Plato	3	
Fraction (specification required)	9	N O Y
Transmitter compact mounted on sensor		
No transmitter, sensor and adapter only	A	
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with Ex de [ia/ib] T3 -T6 Ex-approval	B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, 1/2" NPT	F	
Cable		
No cable	A	
5 m (16.4 ft) cable	B	
10 m (32.8 ft) cable	C	
25 m (82 ft) cable	D	
50 m (164 ft) cable	E	
75 m (246 ft) cable	F	
150 m (492 ft) cable	G	
Calibration		
Standard calibration 3 flow x 2 points	1	
Standard calibration matched pair 3 flow x 2 points	2	
Accredited calibration matched pair 5 flow x 2 points (DANAK)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-3.1	C12
Welding certificate NDT-Penetrant: ISO 3452	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17
Tag name plate, plastic	Y18
Customer-specific transmitter setup	Y20
Customer-specified, matched pair (5 x 2)	Y60
Customer-specified calibration (5 x 2)	Y61
Customer-specified, matched pair (10 x 1)	Y62
Customer-specified calibration (10 x 1)	Y63
Cleaned for oil and grease	Y80
Special version	Y99

Operating instructions for SITRANS F C FC300

Description	Article No.
• English	A5E00698213
• German	A5E00728101
• Spanish	A5E00746629
• French	A5E00746625

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Cable with multiple plug Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	
• 5 m (16.4 ft)	FDK:083H3015
• 10 m (32.8 ft)	FDK:083H3016
• 25 m (82 ft)	FDK:083H3017
• 50 m (164 ft)	FDK:083H3018
• 75 m (246 ft)	FDK:083H3054
• 150 m (492 ft)	FDK:083H3055



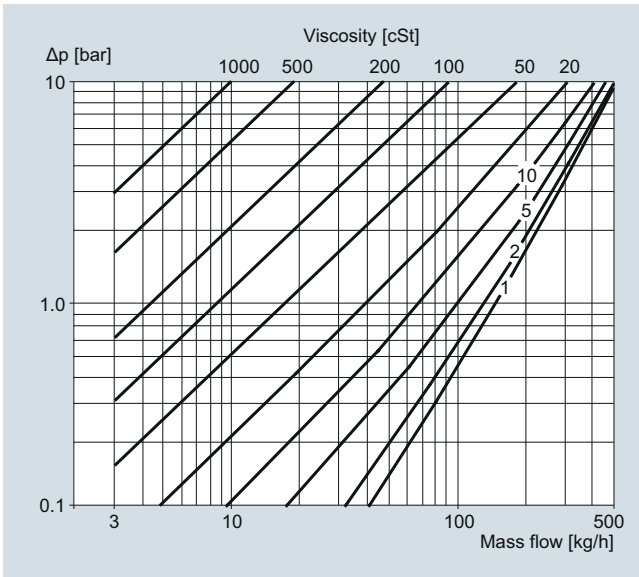
Spare parts

Description	Article No.
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410
Mounting bracket in AISI 304	A5E02590439
Demo suitcase including MASS 6000, FC300 (DN 4), and HART module	A5E00789737

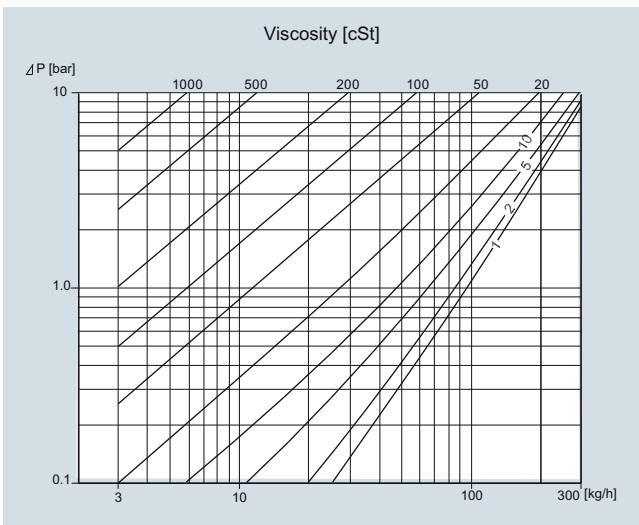


Characteristic curves

Pressure drop



Stainless steel 316L/1.4404



Hastelloy C22/2.4602

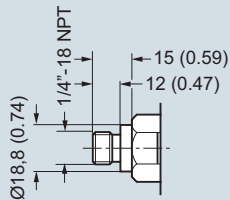
Flow Measurement

SITRANS F C

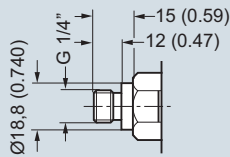
Flow sensor SITRANS FC300

Dimensional drawings

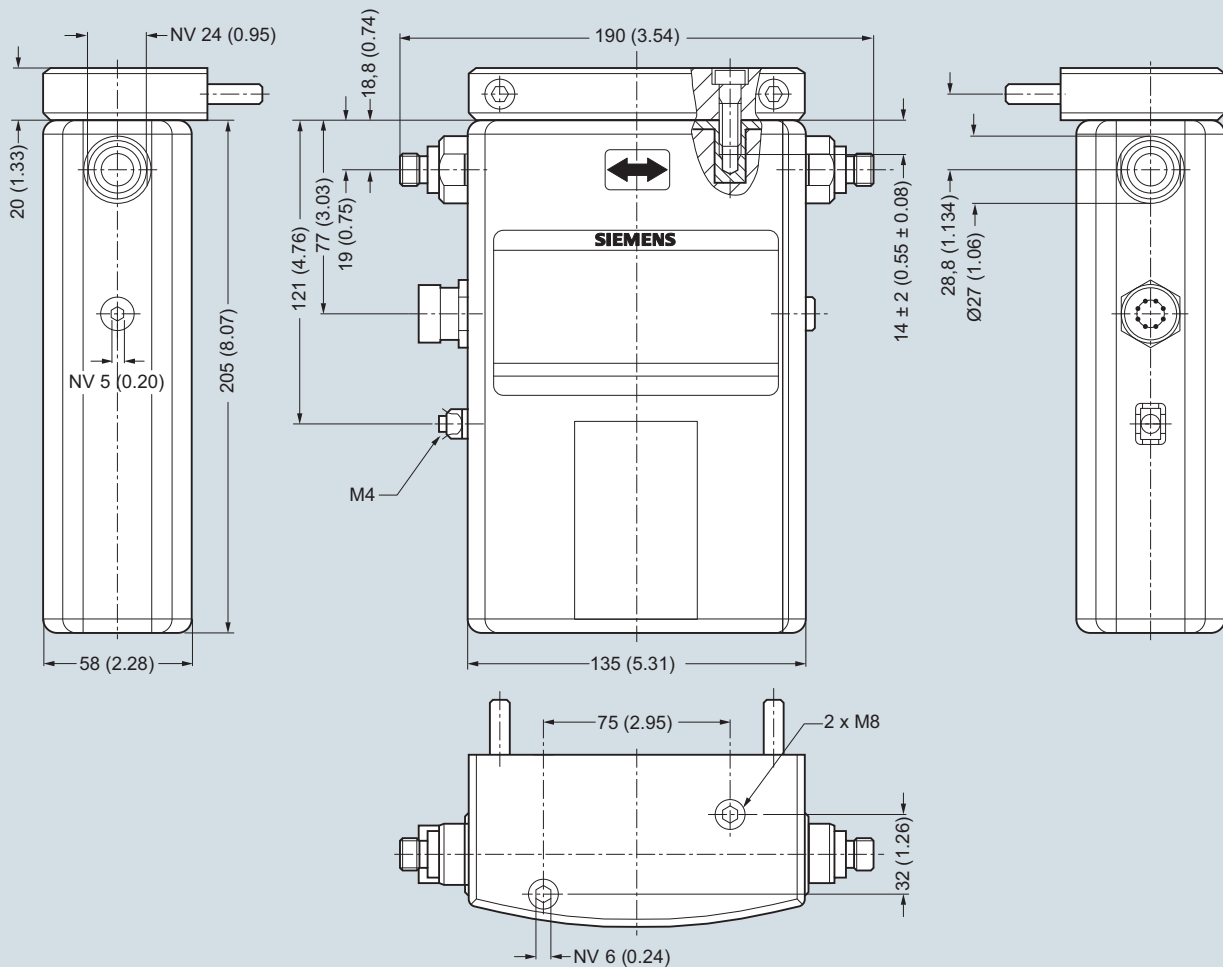
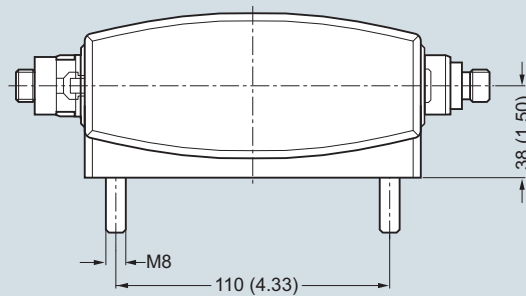
SITRANS FC300 DN 4



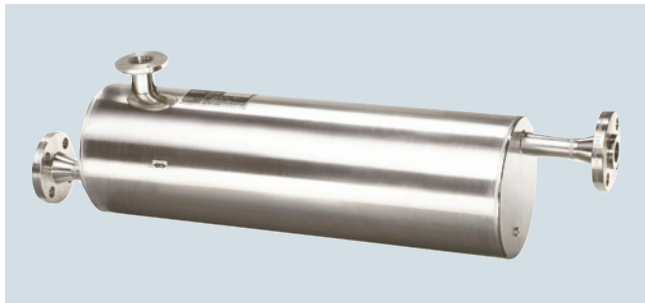
1/4"-18 NPT (ANSI/ASME B1.20.1)



G 1/4" (ISO 228/1)



SITRANS FC300, dimensions in mm (inch)

Overview

MASS 2100 DI 3 to DI 40 is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi-parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through density accuracy (depending upon sensor size) ranging from 0.0005 to 0.0015 g/cm³ with a typical repeatability better than 0.0001 to 0.0002 g/cm³
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Markets' thickest sensor walls ensure optimal life-time and corrosion resistance and high-pressure durability
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor
- Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density changes etc.)
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 minutes
- Intrinsically safe Ex design ia IIC as standard, making service in hazardous area possible without having to demount the sensor if a compact Ex d transmitter needs service
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement
- Uniform sensor interface matching all transmitter versions at the same time whether it is compact IP67/NEMA 6, compact Ex d or remote installation, one sensor fits all

Application

Coriolis mass flowmeters are suitable for measuring all liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install and the Coriolis flowmeter is recognized for its high accuracy in a wide turn-down ratio which is a paramount in many applications.

The main applications of the Coriolis flowmeter can be found in all industries, such as:

Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, Brix/Plato, fruit juices and pulps, bottling, CO ₂ dosing, CIP-liquids
Automotive	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots
Oil and gas	Filling of gas bottles, furnace control, test separators, LPG
Water and waste water	Dosing of chemicals for water treatment

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

Design

The MASS 2100 sensor consists of a single bent tube in a double bent pipe configuration, welded directly to the process connectors at each end.

The centre-block is brazed onto the sensor pipes from the outside acting as a mechanical low pass filter.

The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with a wide variety of process connections.

The enclosure is made in stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP67.

The sensor is as standard Ex ia approved, intrinsically safe.

The sensor can be installed in horizontal or vertical position. In horizontal position the sensor is self draining.

Heating: All the sensors MASS 2100, DI 3 to DI 40, can optionally be equipped with a heating coil to avoid solidification of sensitive fluids during down-time or period between discontinuing processes. This feature gives the user an alternative to the costly electrical heating normally used, as it gives the freedom to choose either hot water, superheated steam or hot oil, to maintain a constant temperature inside the sensor.

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

Function

The measuring principle is based on the Coriolis effect. See "System information SITRANS F C Coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for compact and remote installation as well as SIFLOW FC070 standard and Ex type transmitters.

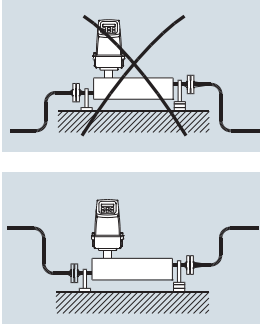
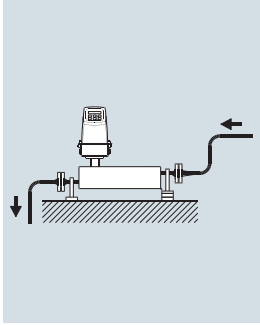
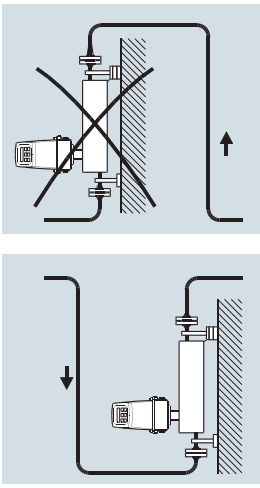
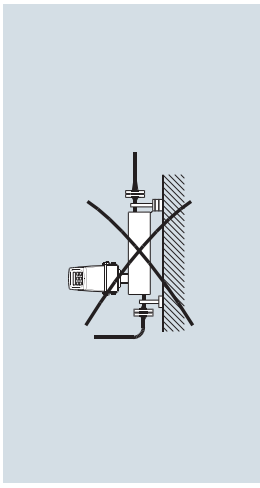
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

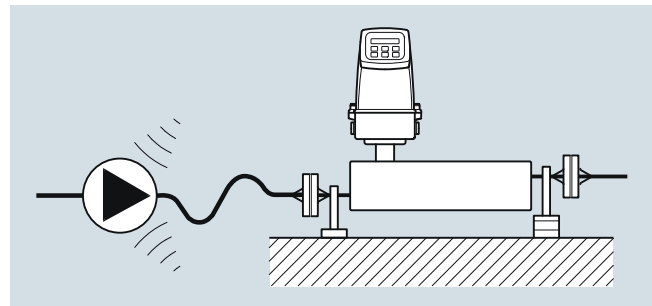
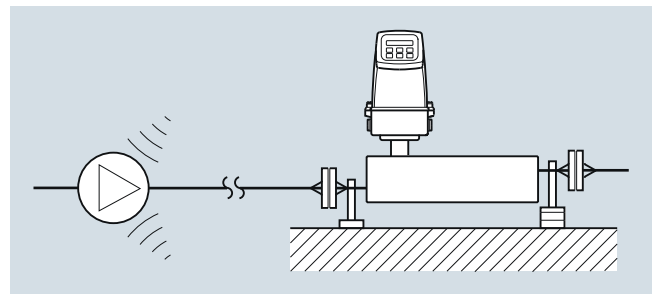
Installation guidelines MASS 2100 DI 3 ... DI 40 (1/8" ... 1 1/2")

Installation of sensor

In order to perform according to given specifications for flow and density accuracy, the sensor must be installed using rigid mounting brackets as shown in the installation examples.

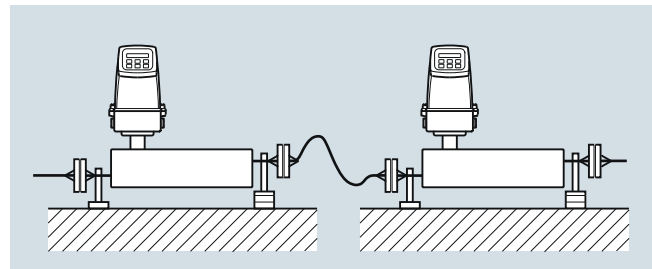
If the liquid is volatile or contains solid particles, vertical mounting is not recommended.

	Liquid	Gas
Horizontal		
Vertical		



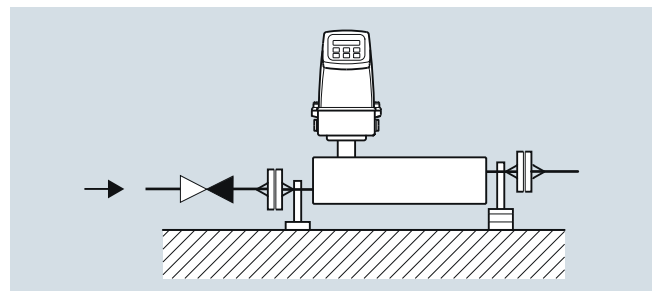
Vibration

Always locate the flowmeter as far away as possible from components that generate mechanical vibration in the piping.



Cross talk

Cross talk between sensors mounted close to each other may disturb the measurement. To avoid cross talk never mount more than one meter on each frame and mount flexible hose connections between the sensors as shown.



Zero point adjustment

To facilitate zero point adjustment a shut-off valve should always be mounted in connection with the sensor as a proper zero point setting is essential for a good accuracy.

Technical specifications

Versions (mm (inch))		DI 3 (1/8)	DI 6 (¼)	DI 15 (5/8)	DI 25 (1)	DI 40 (1½)
Inside pipe diameter (sensor consists of one continuous pipe)	mm (inch)	3.0 (0.12)	6.0 (0.24)	14.0 (0.55)	29.7 (1.17)	43.1 (1.70)
Pipe wall thickness	mm (inch)	0.5 (0.02)	1.0 (0.04)	1.0 (0.04)	2.0 (0.08)	2.6 (0.10)
Mass flow measuring range	kg/h (lb/h)	0 ... 250 (0 ... 550)	0 ... 1000 (0 ... 2200)	0 ... 5600 (0 ... 12345)	0 ... 25000 (0 ... 55100)	0 ... 52000 (0 ... 114600)
Density	g/cm ³ (lb/inch ³)	0 ... 2.9 (0 ... 0.10)				
Fraction e.g.	°Brix	0 ... 70 (applicable temperature range: 10 ... 99 °C (50 ... 210.2 °F))				
Temperature						
Standard	°C (°F)	-50 ... +180 °C (-58 ... +356 °F)				
Liquid pressure measuring pipe¹⁾						
Stainless steel	bar (psi)	230 (3336)	265 (3844)	130 (1885)	110 (1595)	105 (1523)
Hastelloy C22/2.4602	bar (psi)	350 (5076)	410 (5946)	200 (2900)	185 (2683)	not available
Materials		Stainless steel AISI 316L/1.4435				
Measuring pipe, flange and thread connection		Hastelloy C22/2.4602				not available
Enclosure and enclosure material		IP67 (NEMA 4) and stainless steel AISI 316L/1.4404, The housing is not rated for pressure containment				
Process connections²⁾						
Flange						
EN 1092-1, PN 40		DN 10	DN 15	DN 25	DN 40	
ANSI B16.5, Class 150		½"	½"	1"	1½"	
ANSI B16.5, Class 600 (Class 300)		½"	½"	1"	1½"	
Dairy screwed connection (PN 16/25/40)³⁾						
DIN 11851		DN 10	DN 15	DN 32	DN 40	
ISO 2853/BS 4825 part 4 (SS3351)		25 mm	25 mm	38 mm	51 mm	
Dairy clamp connection (PN 16)³⁾						
ISO 2852/BS 4825 part 3 (SMS3016)		25 mm	25 mm	38 mm	51 mm	
Thread						
ISO 228/1, PN 100		G¼" female	G¼" male	G½" male	G1" male	G2" male
ANSI/ASME B1.20.1, PN 100		¼" NPT female	¼" NPT male	½" NPT male	1" NPT male	2" NPT male
Cable connection		Multiple plug connection to sensor 5 x 2 x 0.35 mm ² twisted and screened in pairs, ext. Ø 12 mm				
Ex-version		Ex ia IIC T3-T6, DEMKO 03 ATEX 135252X				
Weight approx.	kg (lb)	4 (8.8)	8 (17.6)	12 (26.5)	48 (105.8)	70 (154.5)

¹⁾ Max. at 20 °C (68 °F), DIN 2413, DIN 17457

²⁾ Other connections to order, see "Selection and Ordering data"

³⁾ Material, AISI 316/1.4401 or corresponding

For accuracy specification see "System information SITRANS F C".

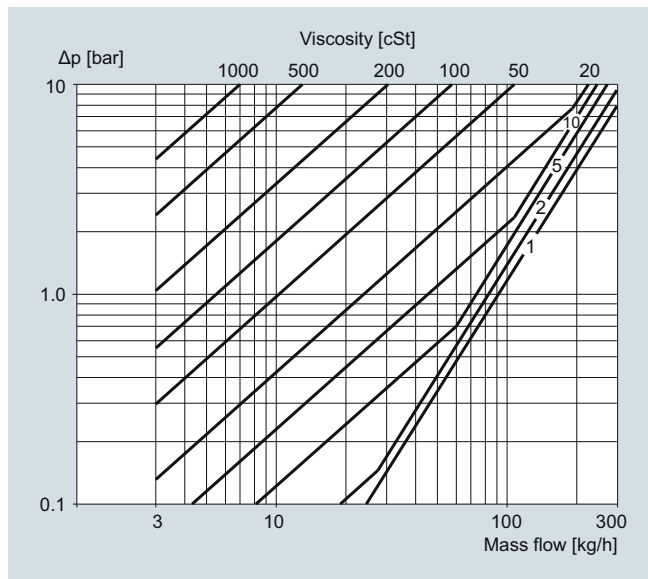
Flow Measurement

SITRANS F C

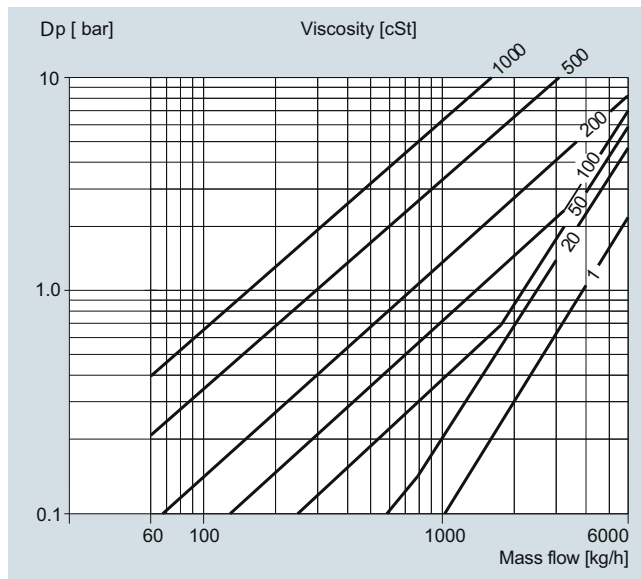
Flow sensor MASS 2100 DI 3 to DI 40

Pressure drop

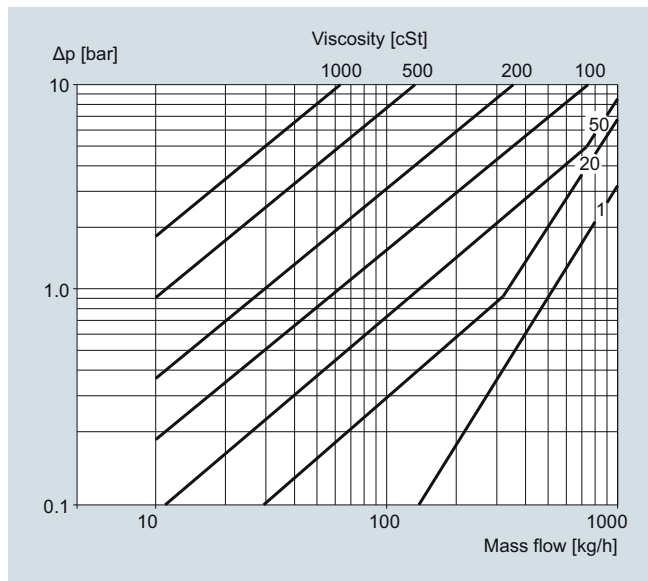
3



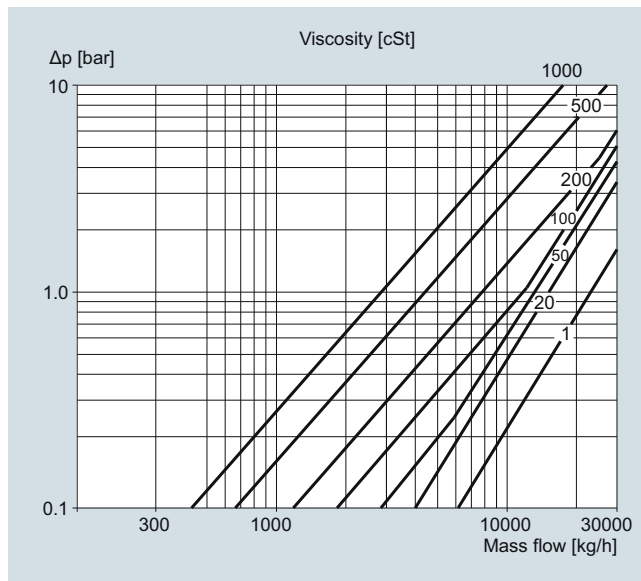
MASS 2100 DI 3 (1/8"), pressure drop for density = 1000 kg/m³



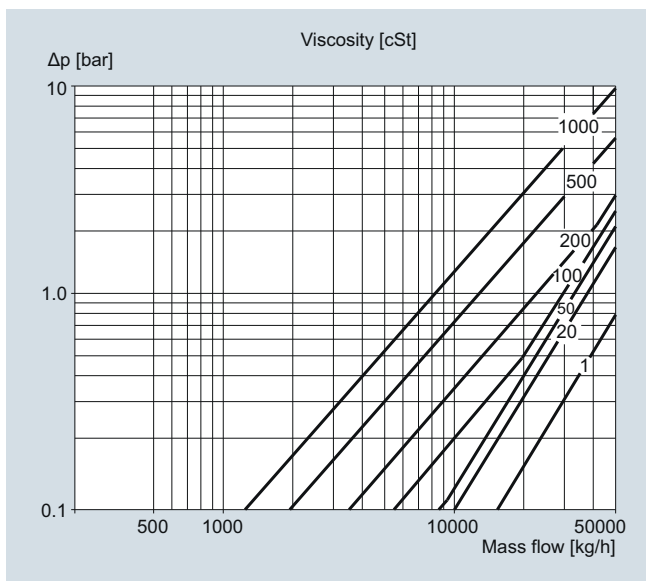
MASS 2100 DI 15 (1/2"), pressure drop for density = 1000 kg/m³



MASS 2100 DI 6 (1/4"), pressure drop for density = 1000 kg/m³

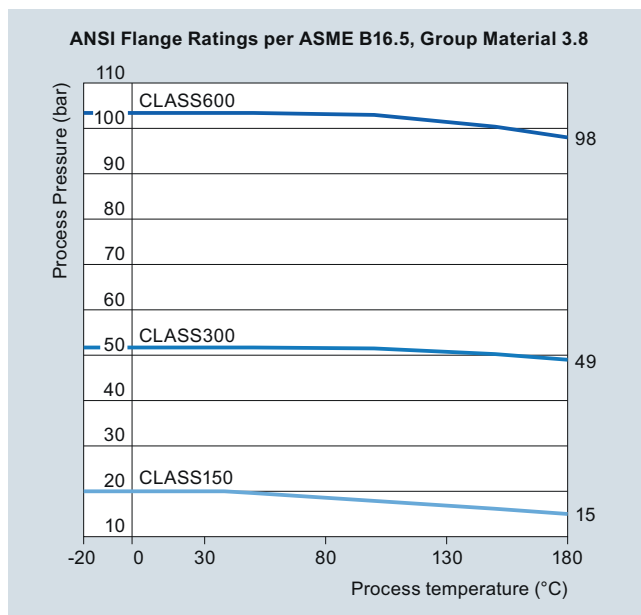


MASS 2100 DI 25 (1"), pressure drop for density = 1000 kg/m³

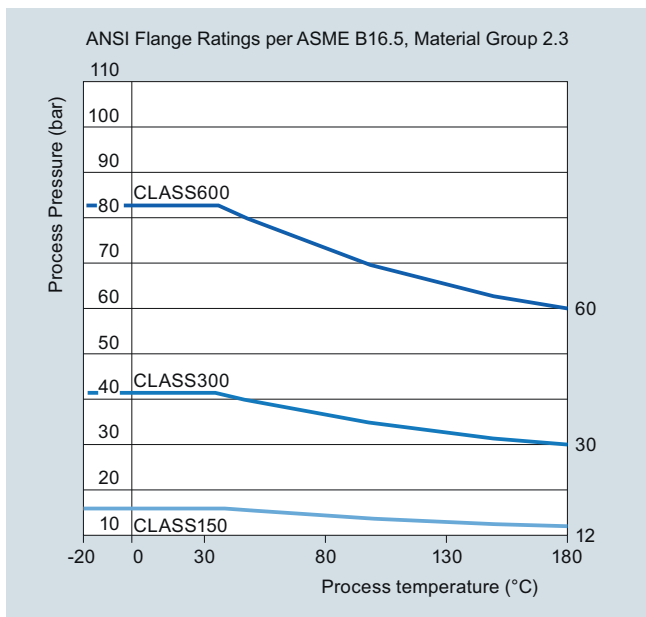


MASS 2100 DI 40 (1½"), pressure drop for density = 1000 kg/m³

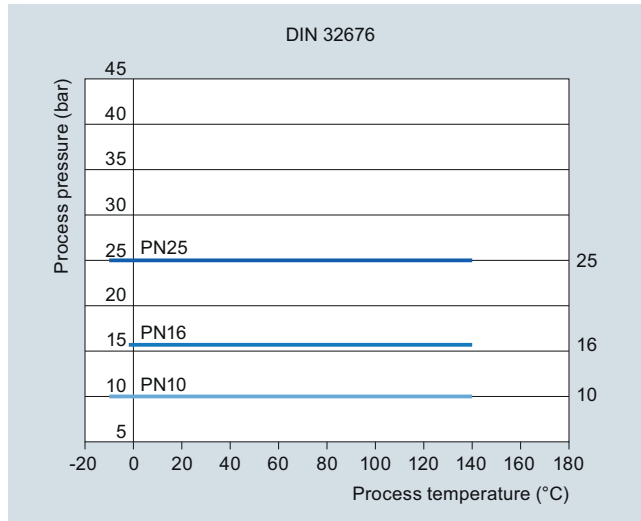
Pressure/temperature curves



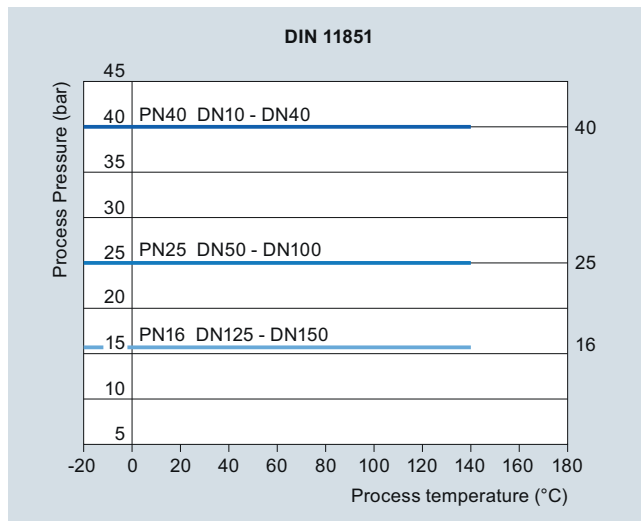
ASME flanges B16.5 Hastelloy C22/2.4602



ASME flanges B16.5 stainless steel



DIN 32676 flanges stainless steel (PN 10 ... PN 25)



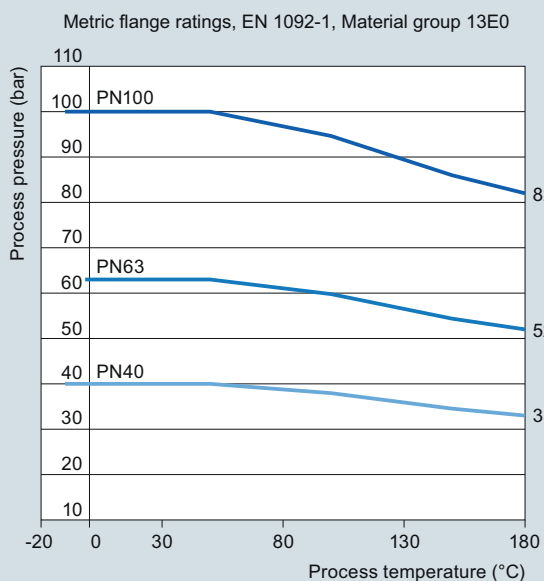
DIN 11851 flanges stainless steel (PN 25 ... PN 40)

Flow Measurement

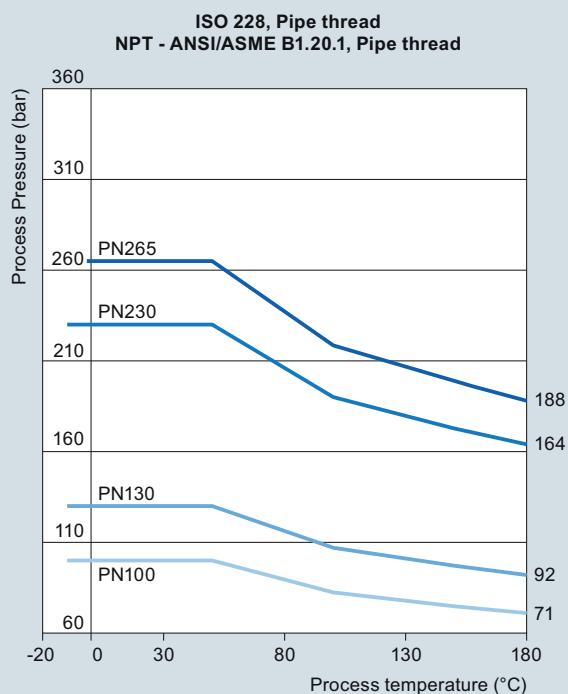
SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

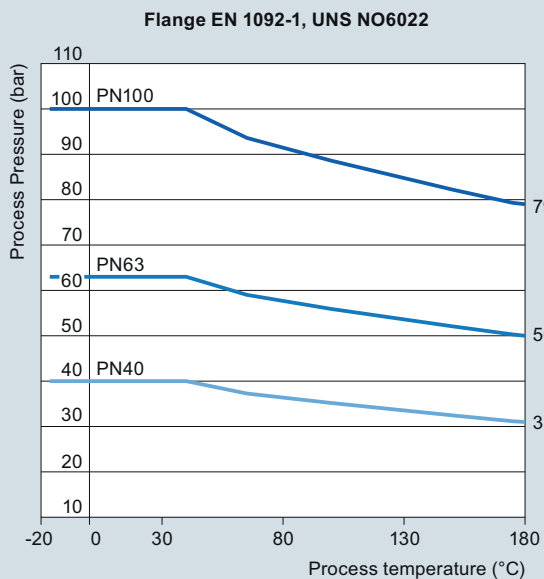
3



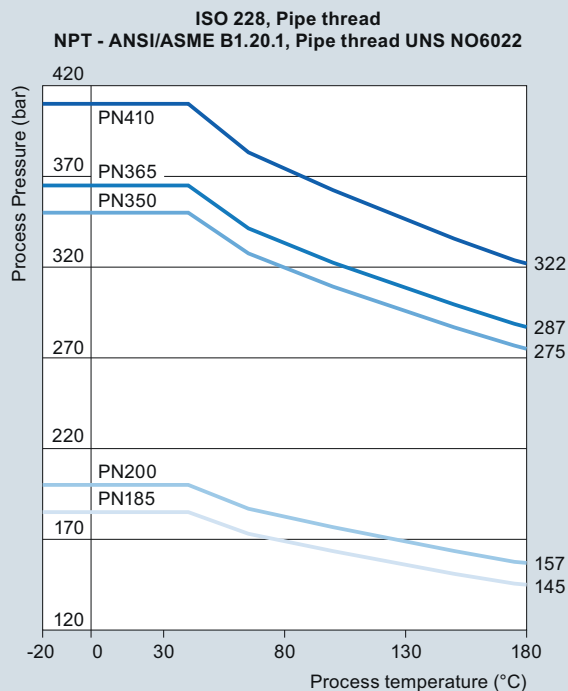
EN 1092 flanges stainless steel (PN 40 ... PN 100)



ISO 228 and NPT pipe thread stainless steel (PN 100 ... PN 265)



EN 1092 flanges Hastelloy C22/2.4602 (PN 40 ... PN 100)



ISO 218 and NPT pipe thread stainless steel (PN 185 ... PN 410)

For further information on the PED standard and requirements, see page 9/6.

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors			SITRANS F C sensors		
MASS 2100 without heating jacket	7ME4100-		MASS 2100 without heating jacket	7ME4100-	
MASS 2100 heated, DN 15 connection	7ME4200-		MASS 2100 heated, DN 15 connection	7ME4200-	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME4210-		MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME4210-	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Diameter			Dairy screwed connection DIN 11851		
Stainless steel AISI 316L/1.4435 DI 3 (PN 100/PN 230)	1C		DN 10 (PN 40)	40	
DI 6	1D		DN 15 (PN 40)	41	
DI 15	1E		DN 25 (PN 40)	42	
DI 25	1F		DN 32 (PN 40)	43	
DI 40	1G		DN 40 (PN 25)	44	
Hastelloy C22/2.4602 DI 3 (PN 100/PN 350)	2C		DN 50 (PN 25)	45	
DI 6	2D		DN 65 (PN 25)	46	
Pressure			Dairy clamp connection ISO 2852 (DIN 32676)		
PN 16 (DI 6, DI 15, DI 25 and DI 40)	A		Cone down the sensor in order to obtain self-drainage with connectors ISO 2852		
PN 25 (DI 6, DI 15, DI 25 and DI 40)	B		25 mm (PN 16)	50	
PN 40 (DI 6, DI 15, DI 25 and DI 40)	C		38 mm (PN 16)	51	
PN 100 (DI 3, DI 6, DI 15, DI 25 and DI 40)	D		51 mm (PN 16)	52	
PN 105 (DI 40, 2", AISI 316L/1.4404)	E		Dairy screwed connection ISO 2853		
PN 110 (DI 25, 1", AISI 316L/1.4404)	F		25 mm (PN 16)	60	
PN 130 (DI 15, ½", AISI 316L/1.4404)	G		38 mm (PN 16)	61	
PN 185 (DI 25, 1", Hastelloy C22/2.4602)	J		51 mm (PN 16)	62	
PN 200 (DI 15, ½", Hastelloy C22/2.4602)	K		Configuration/calibration type		
PN 230 (DI 3, ¼", AISI 316L/1.4404)	L		Standard	1	
PN 265 (DI 6, ¼", AISI 316L/1.4404)	M		Density	2	
PN 350 (DI 3, ¼", Hastelloy C22/2.4602)	N		Brix/Plato	3	
PN 410 (DI 6, ¼", Hastelloy C22/2.4602)	Q		Fraction (specification required)	9	NOY
Class 150 (DI 6, DI 15, DI 25 and DI 40)	R		Transmitter compact mounted on sensor		
Class 600 (DI 6, DI 15, DI 25 and DI 40)	S		No transmitter, sensor and adapter only	A	
Process connection/flange			MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with Ex de [ia/ib] T3-T6 Ex-approval	B	
Pipe thread			MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	C	
G ¼"	10		MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
¼" NPT	11		MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
G ½"	12		MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	F	
½" NPT	13		Cable		
G 1	14		No cable	A	
1" NPT	15		5 m (16.4 ft) cable	B	
G 2"	16		10 m (32.8 ft) cable	C	
2" NPT	17		25 m (82 ft) cable	D	
Flange EN1092-1 Form B			50 m (164 ft) cable	E	
DN 10 (PN 40/PN 100)	20		75 m (246 ft) cable	F	
DN 15 (PN 40/PN 100)	21		150 m (492 ft) cable	G	
DN 25 (PN 40/PN 100)	22		Calibration/verification		
DN 40 (PN 40/PN 100)	23		Standard calibration 3 flow x 2 points	1	
DN 50 (PN 40/PN 100)	24		Stand. calibration matched pair 3 flow x 2 points	2	
Flange ASME/ANSI B 16.5			Accredited calibration matched pair 5 flow x 2 points (DANAK to ISO 17025)	3	
½" (class 150/class 600)	30		Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	
¾" (class 150/class 600)	31				
1" (class 150/class 600)	32				
1 ½" (class 150/class 600)	33				
2" (class 150/class 600)	34				

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

Dairy MLFB example

MASS 2100

Sensor size DI 15,
AISI 316L/1.4435

PN 40

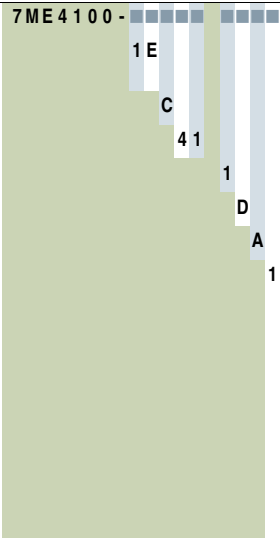
DN 15 connector

Standard configuration/calibration

MASS 6000 IP67 compact mounted

No cable

Standard calibration, 3 flow x 2 points



Selection and Ordering data

Order code

Additional information

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Pressure testing certificate PED: 97/23/EC

C11

Material certificate EN 10204-3.1

C12

NDT- X-ray inspection report: EN 1435

C13

DI3 sensor only: NDT-Penetrant inspection report
ISO 3452.

Factory certificate according to EN 10204 2.2

C14

Factory certificate according to EN 10204 2.1

C15

Tag name plate, stainless steel

Y17

Tag name plate, plastic

Y18

Customer-specific transmitter setup

Y20

Customer-specified, matched pair (5 x 2)

Y60

Customer-specified calibration (5 x 2)

Y61

Customer-specified, matched pair (10 x 1)

Y62

Customer-specified calibration (10 x 1)

Y63

Cleaned for oil and grease

Y80

Special version

Y99

Operating instructions for

SITRANS F C MASS 2100 DI 3 to DI 40

Description	Article No.
• English	A5E02896535
• German	A5E03073519
• Spanish	A5E03073549
• French	A5E03073539

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.


All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>


Selection and Ordering data

Accessories

Description	Dimension	Article No.
Mating parts for hygienic fittings DIN 11851 Includes: • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets	DN 10	FDK:085U1016
	DN 15	FDK:085U1017
	DN 25	FDK:085U1019
	DN 32	FDK:085U1020
	DN 40	FDK:085U1021
	DN 50	FDK:085U1022
Mating parts for hygienic clamp ISO 2852 Includes: • 2 clamps • 2 mating parts • 2 EPDM gaskets	25 mm	FDK:085U1029
	40 mm	FDK:085U1031
	50 mm	FDK:085U1032
2 EPDM gaskets with collar for mounting set DIN 11851	DN 10	FDK:085U1006
	DN 15	FDK:085U1007
	DN 25	FDK:085U1009
	DN 32	FDK:085U1010
	DN 40	FDK:085U1011
	DN 50	FDK:085U1012
DN 65	FDK:085U1013	

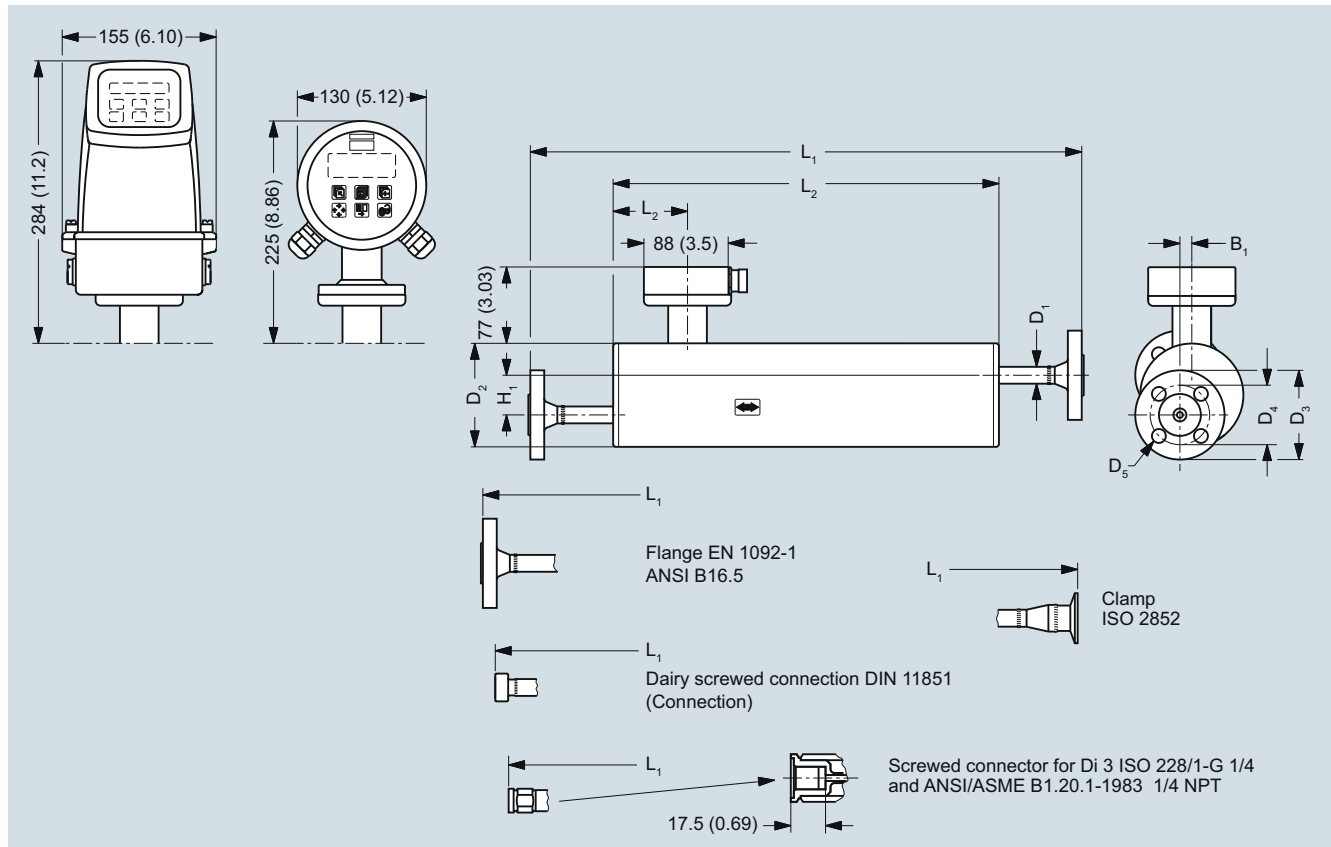
Description	Length	Article No.
Cable with multiple plug Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)		
	5 m (16.4 ft)	FDK:083H3015
	10 m (32.8 ft)	FDK:083H3016
	25 m (82 ft)	FDK:083H3017
	50 m (164 ft)	FDK:083H3018
	75 m (246 ft)	FDK:083H3054
150 m (492 ft)	FDK:083H3055	

Spare parts

Description	Article No.
Adapter for MASS 2100	FDK:083L8889
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit, including programming (Sensor Serial No. and Article No. must be specified by ordering)	 FDK:083H4410

Dimensional drawings

MASS 2100 sensor



Dimension in mm (inch)

For not listed variants please contact product support

Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
DI (inch)	Type	Pressure rating	Size	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
DI 3 (1/8)	Pipe thread ISO 228/1 - G 1/4	PN 100	1/4"	400	280	75.5	60	0	21.3	104	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - 1/4" NPT	PN 100	1/4"	400	280	75.5	60	0	21.3	104	-	-	-
DI 6 (1/4)	Flange EN 1092-1	PN 100	DN 10	580	390	62.0	40	12	17.0	104	100	70.0	14.0
	Flange EN 1092-1	PN 40	DN 10	560	390	62.0	40	12	17.0	104	90.0	60.0	14.0
	Flange ANSI B16.5	Class 150	1/2"	624	390	62.0	40	12	17.0	104	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	1/2"	608	390	62.0	40	12	17.0	104	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 10	532	390	62.0	40	12	17.0	104	-	-	-
	Clamp ISO 2852	PN 16	25 mm	570	390	62.0	40	12	17.0	104	-	-	-
DI 15 (1/2)	Flange EN 1092-1	PN 100	DN 15	634	444	75.5	44	20	21.3	129	105	75.0	14.0
	Flange EN 1092-1	PN 40	DN 15	620	444	75.5	44	20	21.3	129	95.0	65.0	14.0
	Flange ANSI B16.5	Class 150	1/2"	639	444	75.5	44	20	21.3	129	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	1/2"	660	444	75.5	44	20	21.3	129	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 15	586	444	75.5	44	20	21.3	129	-	-	-
	Clamp ISO 2852	PN 16	25 mm	624	444	75.5	44	20	21.3	129	-	-	-
DI 25 (1)	Flange EN 1092-1	PN 100	DN 25	970	700	75.5	126	25	33.7	219	140.0	100.0	18.0
	Flange EN 1092-1	PN 40	DN 25	934	700	75.5	126	25	33.7	219	115.0	85.0	14.0
	Flange ANSI B16.5	Class 150	1"	967	700	75.5	126	25	33.7	219	108.0	79.2	15.7
	Flange ANSI B16.5	Class 600	1"	992	700	75.5	126	25	33.7	219	124.0	88.9	19.1
	Screwed connection DIN 11851	PN 40	DN 32	922	700	75.5	126	25	33.7	219	-	-	-
	Clamp ISO 2852	PN 16	38 mm	940	700	75.5	126	25	33.7	219	-	-	-
DI 40 (1 1/2)	Flange EN 1092-1	PN 100	DN 40	1100	850	75.5	180	0	48.3	273	170.0	125.0	22.0
	Flange EN 1092-1	PN 40	DN 40	1063	850	75.5	180	0	48.3	273	150.0	110.0	18.0
	Flange ANSI B16.5	Class 150	1 1/2"	1100	850	75.5	180	0	48.3	273	127.0	98.6	15.7
	Flange ANSI B16.5	Class 600	1 1/2"	1128	850	75.5	180	0	48.3	273	155.4	114.3	22.4
	Screwed connection DIN 11851	PN 25	DN 50	1090	850	75.5	180	0	48.3	273	-	-	-
	Clamp ISO 2852	PN 25	51 mm	1062	850	75.5	180	0	48.3	273	-	-	-

Flow Measurement

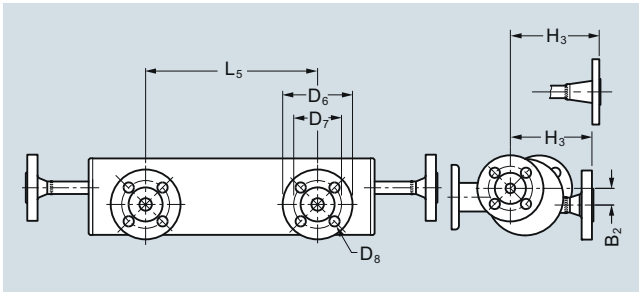
SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

For not listed variants please contact product support.

Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
	DI (inch)	Type	Pressure rating	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch
DI 3 (1/8)	Pipe thread ISO 228/1 - G 1/4	PN 100	1/4"	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - 1/4" NPT	PN 100	1/4"	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
DI 6 (1/4)	Flange EN 1092-1	PN 100	DN 10	22.83	15.35	2.44	1.57	0.47	0.67	4.09	3.94	2.76	0.55
	Flange EN 1092-1	PN 40	DN 10	22.05	15.35	2.44	1.57	0.47	0.67	4.09	3.54	2.36	0.55
	Flange ANSI B16.5	Class 150	1/2"	24.57	15.35	2.44	1.57	0.47	0.67	4.09	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	1/2"	23.94	15.35	2.44	1.57	0.47	0.67	4.09	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 10	20.94	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
	Clamp ISO 2852	PN 16	25 mm	22.44	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
DI 15 (1/2)	Flange EN 1092-1	PN 100	DN 15	24.96	17.48	2.97	1.73	0.79	0.84	5.08	2.95	4.13	0.55
	Flange EN 1092-1	PN 40	DN 15	24.41	17.48	2.97	1.73	0.79	0.84	5.08	3.74	2.56	0.55
	Flange ANSI B16.5	Class 150	1/2"	25.16	17.48	2.97	1.73	0.79	0.84	5.08	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	1/2"	25.98	17.48	2.97	1.73	0.79	0.84	5.08	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 15	23.07	17.48	2.97	1.73	0.79	0.84	5.08	-	-	-
	Clamp ISO 2852	PN 16	25 mm	24.57	17.48	2.97	1.73	0.79	0.84	5.08	-	-	-
DI 25 (1)	Flange EN 1092-1	PN 100	DN 25	38.19	27.56	2.97	4.96	0.98	1.33	8.62	3.94	5.51	0.71
	Flange EN 1092-1	PN 40	DN 25	36.77	27.56	2.97	4.96	0.98	1.33	8.62	4.53	3.35	0.55
	Flange ANSI B16.5	Class 150	1"	38.07	27.56	2.97	4.96	0.98	1.33	8.62	4.25	3.12	0.62
	Flange ANSI B16.5	Class 600	1"	39.06	27.56	2.97	4.96	0.98	1.33	8.62	4.88	3.50	0.75
	Screwed connection DIN 11851	PN 40	DN 32	36.30	27.56	2.97	4.96	0.98	1.33	8.62	-	-	-
	Clamp ISO 2852	PN 16	38 mm	37.01	27.56	2.97	4.96	0.98	1.33	8.62	-	-	-
DI 40 (1 1/2)	Flange EN 1092-1	PN 100	DN 40	43.31	33.46	2.97	7.09	0	1.9	10.75	4.92	6.69	0.87
	Flange EN 1092-1	PN 40	DN 40	41.85	33.46	2.97	7.09	0	1.9	10.75	5.91	4.33	0.71
	Flange ANSI B16.5	Class 150	1 1/2"	43.31	33.46	2.97	7.09	0	1.9	10.75	5	3.88	0.62
	Flange ANSI B16.5	Class 600	1 1/2"	44.41	33.46	2.97	7.09	0	1.9	10.75	6.12	4.50	0.88
	Screwed connection DIN 11851	PN 25	DN 50	42.91	33.46	2.97	7.09	0	1.9	10.75	-	-	-
	Clamp ISO 2852	PN 25	51 mm	41.81	33.46	2.97	7.09	0	1.9	10.75	-	-	-

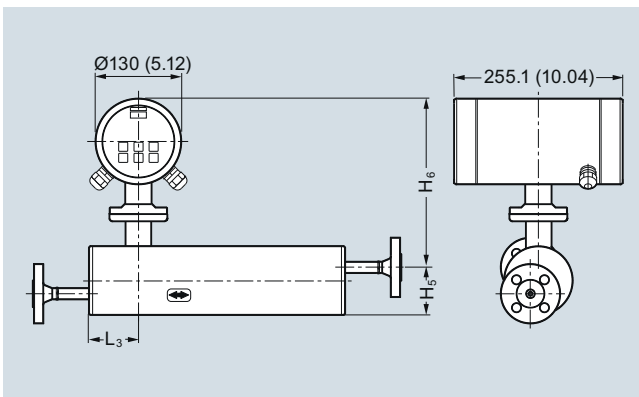
MASS 2100 sensor with "heating jacket"



Dimensions in mm (inch)

Sensor size	Connections heated			L5	H3	B2	D6	D7	D8
DI (inch)	Type	Pressure rating	Size	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
DI 3 (1/8)	EN 1092-1	PN 40	DN 15	234 (9.21)	122 (4.8)	22 (0.87)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	234 (9.21)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (1/4)	EN 1092-1	PN 40	DN 15	234 (9.21)	112 (4.41)	22.7 (0.89)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	234 (9.21)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 15 (1/2)	EN 1092-1	PN 40	DN 15	234 (9.21)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	234 (9.21)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 25 (1)	EN 1092-1	PN 40	DN 15	420 (16.54)	213.6 (8.41)	60 (2.36)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	420 (16.54)	223.2 (8.79)	60 (2.36)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 40 (1 1/2)	EN 1092-1	PN 40	DN 15	500 (19.68)	267.5 (10.53)	43 (1.69)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	500 (19.68)	277.1 (10.91)	43 (1.69)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)

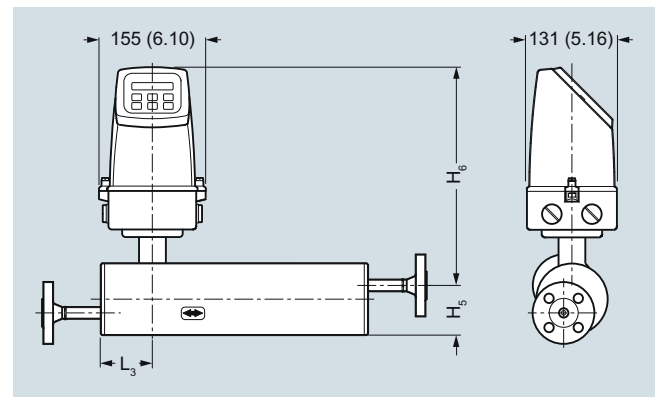
MASS 2100 and MASS 6000 Ex d compact version



Dimensions in mm (inch)

Sensor size	L3	H5	H6	H5 + H6
[DI (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (1/4)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (1/2)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	444 (17.48)
40 (1 1/2)	75 (2.95)	227 (8.94)	271 (10.67)	498 (19.61)

MASS 2100 and MASS 6000 IP67 compact version



Dimensions in mm (inch)

Sensor size	L3	H5	H6	H5 + H6
[DI (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (1/4)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (1/2)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1 1/2)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Flow Measurement

SITRANS F C

Flow sensor MC2

Overview



SITRANS F C MC2 is available in sizes DN 100 and DN 150 (4" and 6").

The MC2 sensor is suitable for accurate mass flow measurement of a variety of liquids.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy and delivers true multi-parameter measurements i.e.: mass flow, volume flow, density, temperature and fraction flow.

The very compact sensor construction makes installation and commissioning of even the largest sizes very straight forward and easy.

Benefits

- High accuracy better than 0.15 % of mass flow rate
- Large dynamic turn-down ratio
- Densitometer performance available through density accuracy better than 0.001 g/cm^3
- Space-saving split-flow sensor design facilitating low pressure loss
- Parallel S-tube design and optimal oriented inductive sensors enhances accuracy and turn-down ratio.
- Self-draining in both horizontal and vertical position
- Rigid enclosure design reduces the influence from pipeline vibration and thermal stress
- 4-wire Pt100 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- SENSORPROM enables true "plug & play" - installed and commissioned in less than 10 minutes.
- Safe Ex design Ex em [ib] IIC
- Sensor pipe available in high-quality stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610 offering optimum corrosion resistance.
- CIP cleanability for food and beverage and pharmaceutical applications

Application

Coriolis mass flowmeters are suitable for measuring all liquids. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity, and flow profile.

Due to this versatility the meter is easy to install and the Coriolis flowmeter is recognized for its high accuracy in a wide turndown ratio which is paramount in many applications.

MC2 sensors are not designed or approved for flow measurement of gaseous process media.

The product is manufactured by ABB Automation Products GmbH and distributed by Siemens.

The main applications of the Coriolis flowmeter can be found in all industries, such as:

Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, Plato/Brix, fruit juices and pulps, bottling, CO ₂ dosing, CIP-liquids
Oil and gas	Liquid measurement, furnace control, test separators, LPG, oil bunkering
Water and waste water	Dosing of chemicals for water treatment

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task. MC2 is **not** recommended for gas applications.

Design

The MC2 sensor consists of 2 parallel measuring pipes, welded directly onto a flow-splitter at each end to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations.

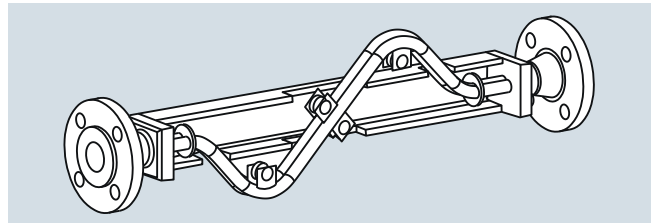
The flow-splitters are welded onto a rigid sensor housing which acts as a mechanical low-pass filter.

The sensor is available in 2 material configurations, AISI 316L/1.4436 or Hastelloy C4/2.4610 with a wide variety of process connections.

The enclosure is made of stainless steel AISI 304/1.4301 with an encapsulation grade of IP67/NEMA 4.

The sensor is Ex-approved Ex em [ib] IIC.

It can be installed in horizontal or vertical position, and is self-draining in both positions.



The MC2 Ex version sensor is based on a different Ex concept than MASS 6000. Therefore the MC2 Ex version sensor can only be connected to MASS 6000 IP67, MASS 6000 19" or SIFLOW FC070 standard versions, which have to be remote mounted in the safe area. MASS 6000 Ex d, MASS 6000 19" Ex and SIFLOW FC070 Ex can **not** be used with MC2 Ex sensors.



Hazardous area
Zone 1 + 2



Safe area

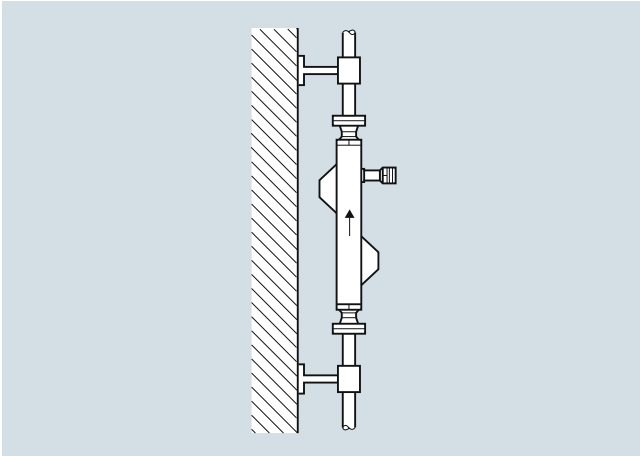
Function

The measuring principle is based on the Coriolis effect. See "System information Coriolis mass flowmeters".

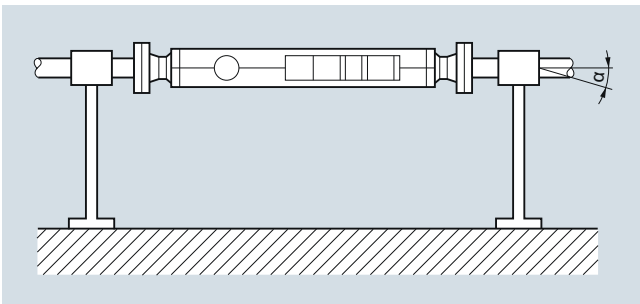
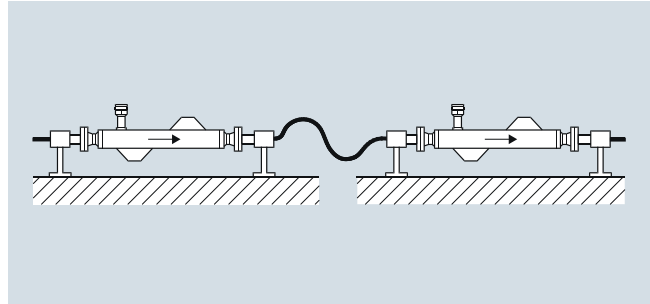
Integration**Installation guidelines MC2 DN 100 and DN 150**Installation of sensor

Rigid mounting brackets must be used when installing the sensor. The brackets must be installed as close to the sensor as possible, attached to the piping outside the process connections.

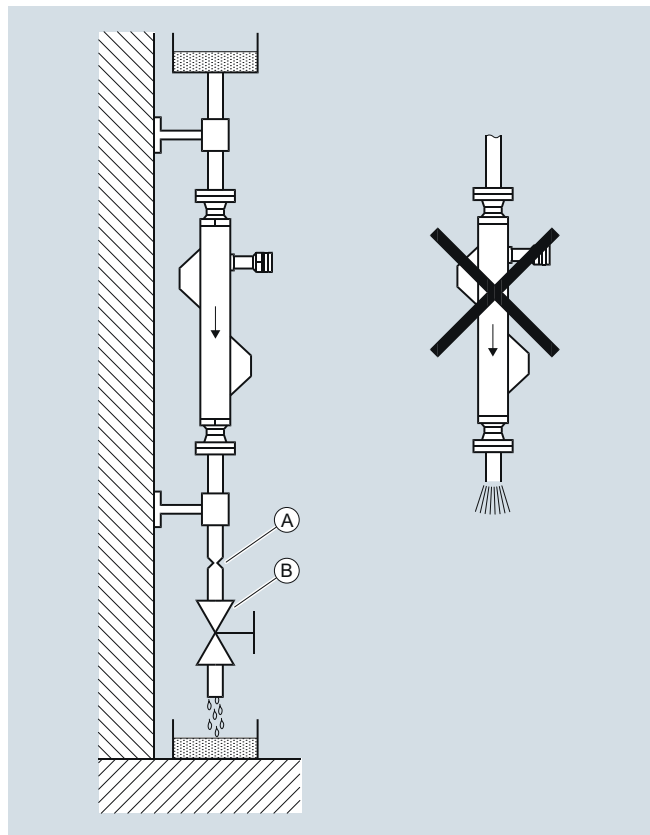
The optimal installation orientation is a vertical installation with an upward flow as shown in the following figure. This has the advantage that any solids contained in the fluid will settle downward and gas bubbles will move upward out of the meter tube when the flow rate is zero. Additionally, it is easy to drain the meter tube. Deposits can thereby be avoided.

Vertical orientation:

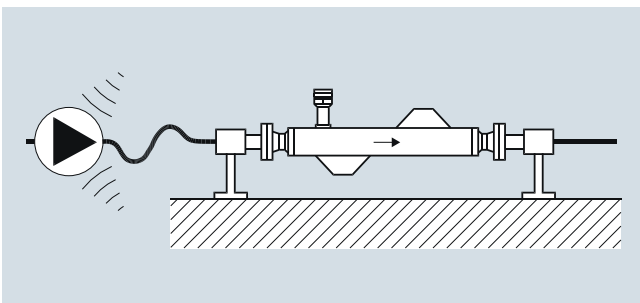
Vertical installation self-draining (upward flow)

Horizontal orientation, self-drainingAvoid cross talkInstallation in a drop line

Mount with reduction (A) or orifice (B) to prevent partially draining (min. back pressure: 0.2 bar).



Installation in a drop line

Avoid vibrations

Flow Measurement

SITRANS F C

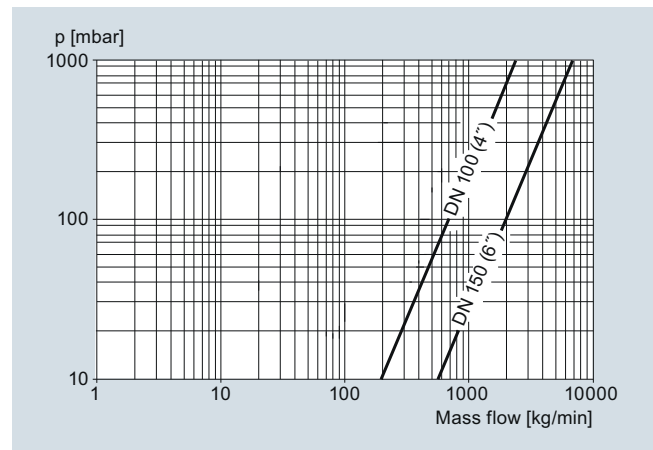
Flow sensor MC2


Technical specifications

Versions (mm (inch))		100 (4)	150 (6)
Inside pipe diameter	mm (inch)	43.1 (1.69)	76.1 (2.99)
Pipe wall thickness	mm (inch)	2.6 (0.10)	3.2 (0.13)
Mass flow measuring range at pressure drop of 2 bar (29 psi) at 1 g/cm³ (0.036 lb/inch³)	kg/h (lb/h)	203 500 (448 640)	602 000 (1 327 181)
Density	g/cm ³ (lb/inch ³)	0.5 ... 3.5 (0.18 ... 0.126)	
Fraction e.g. Brix	°Brix	0 ... 100 (on request)	Not possible
Temperature			
Standard-version		-50 ... +200 °C (-58 ... +392 °F)	
Ex-version		-50 ... +200 °C (-58 ... +392 °F)	
Liquid pressure measuring pipe			
Stainless steel (DIN 2413, 20 °C (68 °F))	bar (psi)	40 (580)	40 (580)
Materials			
Measuring pipe		Stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610	
Enclosure			
Enclosure material/ connection box		IP67 AISI 304 (1.4301)/aluminum, max. pressure 40 bar (580 psi)	
Process connections			
Electrical connections		See dimensional drawings Screw terminals, M 20	
Cable		5 x 2 x 0.35 mm ² twisted and screened in pairs, ext. Ø 12 mm	
Cable length		10, 25, 75 or 150 m (32.8, 82, 246 or 492 ft.)	
Ex-version			
ATEX 1443X		II 2G Ex em [ib] IIC T2-T6	
Weight approx.	kg (lb)	91 (201)	261 (573)

For accuracy specifications see „System information Coriolis mass flowmeters“.

Pressure drop



Selection and Ordering data	Article No.	Ord. code	Dairy MLFB example	Article No.
SITRANS F C flow sensors MC2	7ME4300-		MC2 sensor	7ME4300-
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Nominal diameter Stainless steel AISI 316Ti/1.4571 DN 100 DN 150 Hastelloy C4/2.4610 DN 100 DN 150</p> <p>Nominal pressure PN 40 Class 150 Class 300 Clamps/screwed-connections</p> <p>Process connections Flange EN 1092-1 DN 80 (PN 40, PN 100) DN 100 (PN 40) DN 150 (PN 40) Flange ASME/ANSI B16.5 3" (class 150/300/600) 4" (class 150/300) 6" (class 150/300) Dairy screwed connection to DIN 11851 DN 80 (PN 25) DN 100 (PN 25) Dairy clamp connection DIN 32676 (ISO 2852) Tri-clamp 81 mm clamp (PN 10) 100 mm clamp (PN 10) Aseptic nut flange DIN 11864-2 form A for pipes dimensioned by DIN 11866 DN 80 (3") DN 100 (4")</p> <p>Configuration Flow (0.15% of rate) and density (5 kg/m³ [0.31 lb/ft³]) Flow (0.15% of rate) and density (1 kg/m³ [0.06 lb/ft³])</p> <p>Ex-approval and cable gland Non-Ex, M20 x 1.5 ATEX, M20 x 1.5</p> <p>Cable No cable</p> <p>Calibration Standard</p>	<p>1 D 1 E 2 D 2 E A C D F 2 2 2 3 2 4 3 2 3 3 3 4 4 2 4 3 5 2 5 3 6 3 6 4 1 5 A B A 1</p>		<p>Sensor size DN 100. AISI 316Ti/1.4571 Nominal pressure: Clamps DIN 11851, DN 100, PN 25</p>  <p>Configuration/calibration type: flow and density (5 kg/m³ [0.31 lb/ft³]) Without Ex approval No cable Standard calibration</p>	<p>1 D F 4 3 1 A A 1</p>
			Selection and Ordering data	Order code
			Additional information Please add "-Z" to Article No. and specify Order code(s) and plain text.	
			Pressure testing certificate PED: 97/23/EC	C11
			Material certificate EN 10204-3.1	C12
			Material certificate according to NACE	C16
			Tag name plate, stainless steel	Y17
			Tag name plate, plastic self-adhesive	Y18
			Customer-specified, matched pair (5 x 2)	On request
			Customer-specified calibration (5 x 2)	On request
			Customer-specified, matched pair (10 x 1)	On request
			Customer-specified calibration (10 x 1)	On request
			Operating instructions for SITRANS F C MC2 This device is shipped with ABB documentation and an installation/connection instruction in four languages (Article No. A5E34730442). All literature is also available for free at: http://www.siemens.com/flowdocumentation	

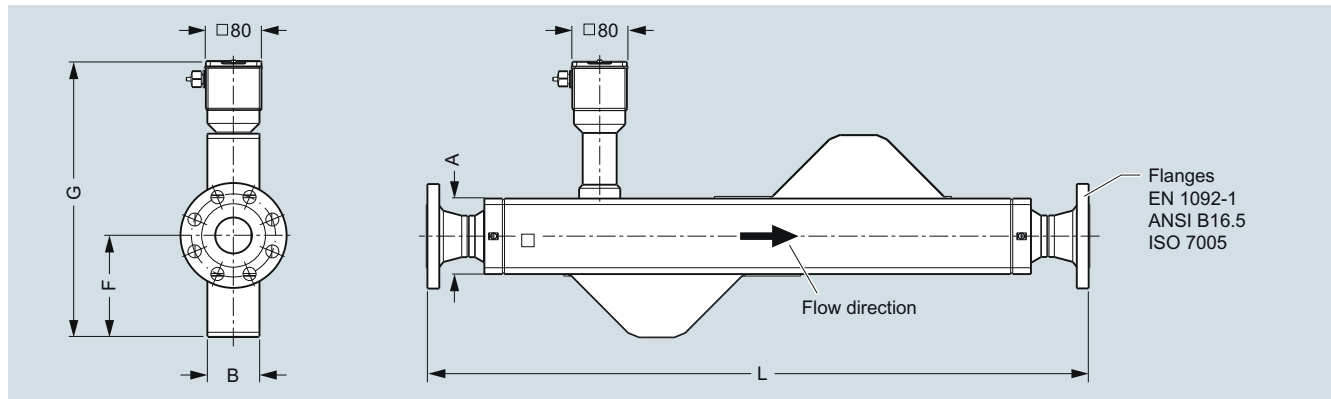
Flow Measurement

SITRANS F C

Flow sensor MC2

Dimensional drawings

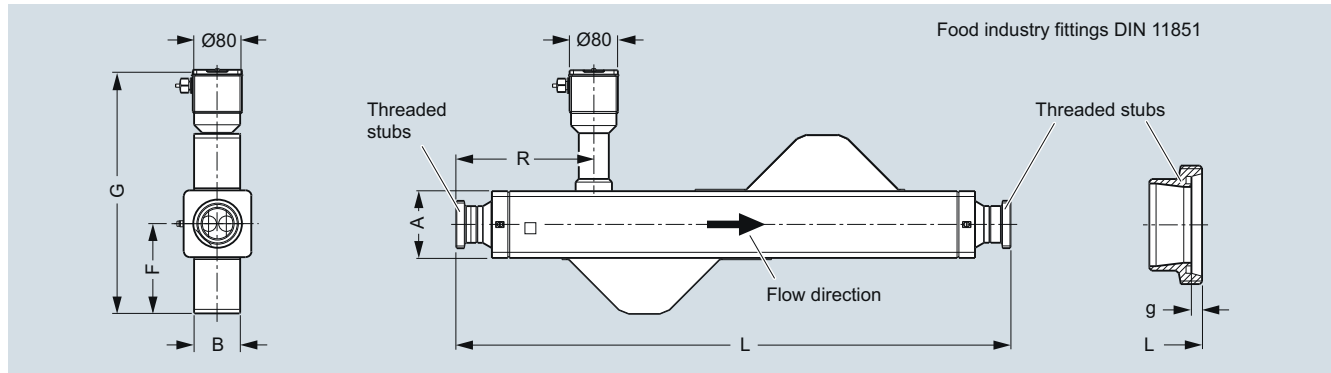
Remote design, flanged construction, DIN EN/ANSI



Meter size	Process connection size		L [mm (inch)]					G ¹⁾ [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	Weight [kg (lb)]		
			DIN 11864-2 form A	EN 1092-1 PN 40	EN 1092-1 PN 100	ANSI B16.5 CL 150	ANSI B16.5 CL 300						ANSI B16.5 CL 600	
4	100	3	80	1618 (63.70)	1640 (64.57)	1680 (66.14)	1660 (65.35)	1680 (66.14)	1702 (67.01)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	84 (185)
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)					91 (201)
		6	150	N/A	1778 (69.92)	N/A	1806 (71.10)	1826 (71.89)	N/A					120 (265)
6	150	6	150	N/A	2040 (80.31)	N/A	2070 (81.50)	2090 (82.28)	N/A	613 (24.13)	285 (11.22)	190 (7.84)	260 (9.84)	260 (573)

¹⁾ For Ex add 54 mm

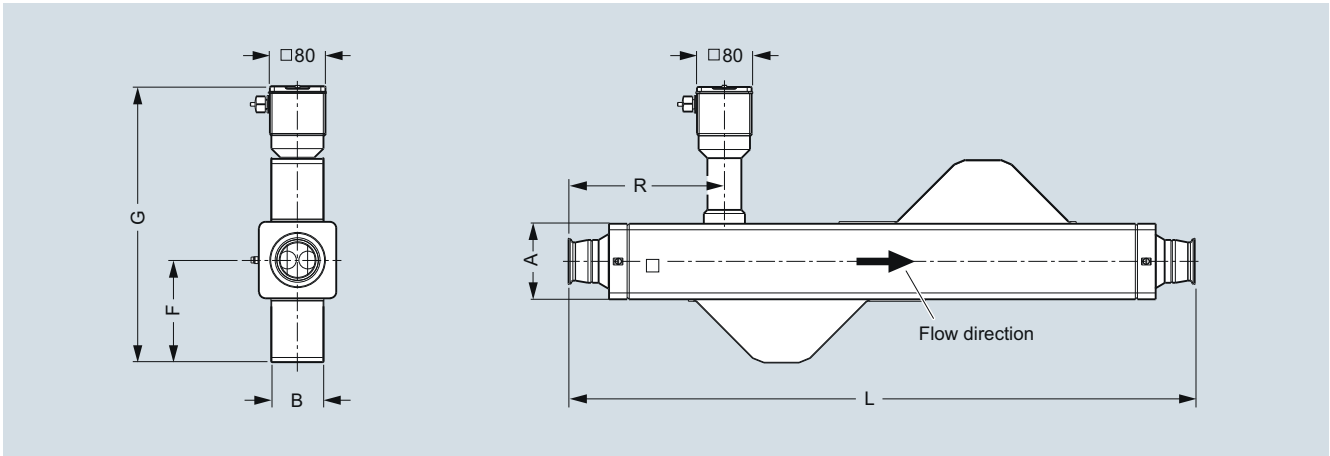
Remote design, food industry fittings, DIN 11851



Meter size	Process connection size			L [mm (inch)]	g [mm (inch)]	G ¹⁾ [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight [kg (lb)]	
	inch	DN										
4	100	3	80	Rd 110 x 1/6	1618 (63.70)	8 (0.31)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	401 (15.79)	82 (180)
		4	100	Rd 130 x 1/4	1463 (57.60)	10 (0.39)					314 (12.36)	86 (190)

¹⁾ For Ex add 54 mm

Remote design, Tri-clamp DIN 32676 (ISO 2852)



Dimensions in mm (inch)

Meter size		Process connection size		L [mm (inch)] ± 3	G ¹⁾ [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight [kg (lb)]
inch	DN	inch	DN							
4	100	3	80	1598 (62.91)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	440 (17.32)	71 (157)
		4	100	1448 (57.01)						

¹⁾ For Ex add 54 mm

Flow Measurement

SITRANS F C

Flow sensor MC2

Process Connections

- Flanges EN 1092-1/ANSI B16.5
- Tri-Clamp DIN 32676 (ISO 2852)
- DN 100: Series 1
- Food Industry fittings DIN 11851

The max. allowable operating pressure is a function of the process connection type, the fluid temperature, the bolts and the gaskets.

Pressure Rating

- PN 16, PN 40
Class 150, Class 300

Housing as secondary containment

- Max. 40 bar

Pressure Equipment Directive 97/23/EG

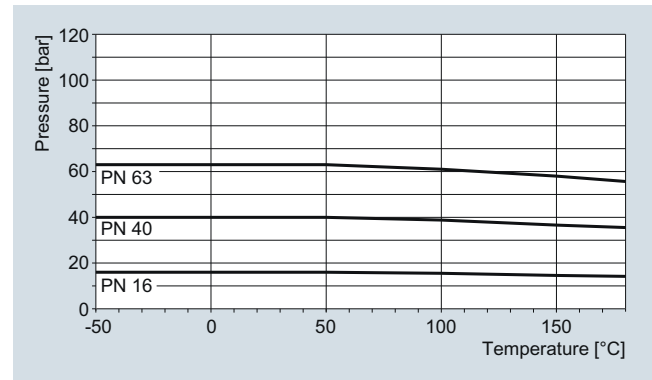
- Conformity evaluation category III, fluid group 1

Corrosion resistance of measuring pipe material to measuring medium has to be considered.

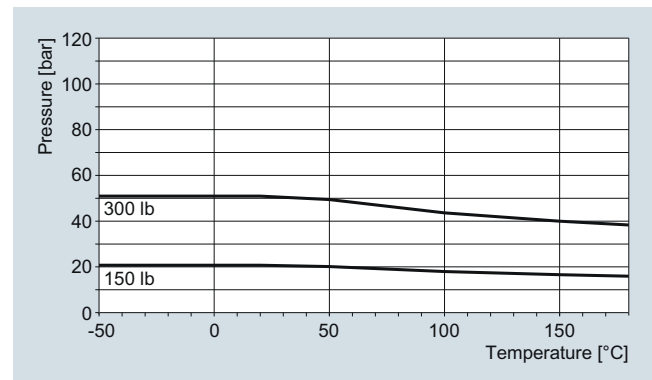
Material strength for process connections

Process connection	Size		PS _{max.} at 20 °C (68 °F)	TS _{max.}	TS _{min.}
	DN	inch			
Thread acc. DIN 11851	100	4	25 (363)	140 (284)	-40 (-40)
Tri-Clamp acc. DIN 32676	100	4	10 (145)	120 (248)	-40 (-40)

Pressure/temperature curves



DIN-Flanges stainless steel AISI 316Ti/1.4571 to DN 100 (4")



ASME-Flanges stainless steel AISI 326Ti/1.4571 to DN 100 (4")

For further information on the PED standard and requirements, see page 9/6.

Overview

Siemens offers two types of ultrasonic flowmeters, inline flowmeters and clamp-on flowmeters. This offers the end user the maximum flexibility to choose the technology that best fits his needs. This chapter shows the inline versions.



SITRANS F US inline ultrasonic flowmeters measure flow of electrically conductive and non-conductive liquids.

Benefits

- Greater flexibility:
 - Sensor sizes from DN 50 to 1 200 mm (2" to 48")
 - Inline retrofit as 1-path and 2-path up to DN 4 000 (160")
 - Compact and remote transmitter installation
 - HART and PROFIBUS PA communication
 - Mains or battery powered solutions
 - Dedicated transmitter portfolio for HVAC, power generation, utility and general industry as well as more demanding applications
- Easier service:
 - Comprehensive self-diagnostic for error indication and logging
 - Exchange of the transducers without interrupting operation
 - Battery lifetime of up to 6 years
- Approvals/certificates:
 - Custody transfer approvals within district heating
 - ATEX
 - Standard with calibration certificate

Application

Inline ultrasonic flowmeters are suitable for measuring the flow of liquids with good acoustic permeability, independent of conductivity, viscosity, temperature, density and pressure.

- max. 3 % solids
- max. 3 % air and gas
- max. 350 cSt

The main applications can be found in the following sectors:

- Raw water intake for water treatment plants
- Treated waste water
- Power generation and utility
- Oil and gas industry and petrochemical industry
- Irrigation systems
- Cooling water plants within the industry and in power stations
- Plants transporting non-conductive liquids
- HART/4 to 20 mA output
- PROFIBUS PA
- ATEX

Flow Measurement

SITRANS F US Inline

System information SITRANS F US

Please see Product selector on the Internet, since some constraints might be related to some of the features:
www.pia-selector.automation.siemens.com



	SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380
	7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...
Industry					
Water, treated waste water	XXX	XX	XXX		XXX
Irrigation	XX	XX	XXX		XXX
Utility, district heating water, cooling	XXX	XX	XXX	XXX	XXX
Utility, district heating, CT approvals required				XXX	
Oil	XX	XXX	XX		X
Cryogenic fluids (only on request)		XXX			
Onshore and Offshore applications	XX	XXX	XX		X
Chemical	XXX	XXX	X		
Design					
Transmitter compact mounted			●	●	●
Transmitter remote mounted	●	●	●	●	●
Transducers can be replaced under pressure		●	●		
Retrofit on existing steel pipes/non-weldable			●		
Transmitter enclosure					
Polyamid, IP67			●	●	●
Die-cast aluminum (painted), IP65	●	●	●		
Communication					
HART	●	●	●		
PROFIBUS PA	●	●	●		
Power supply					
3.6 V Battery			●	●	●
115 ... 230 V AC	●	●	●	●	●
115 ... 230 V AC and 3.6 V battery backup			●	●	●
24 V AC/DC	●	●	●		
Accuracy					
0.25 % (with 4-path system on request)		●			
0.50 %	●	●	●	●	●
Sensor design					
1-path ultrasonic measurement (special request)			● ¹⁾		
2-path ultrasonic measurement	●	●	●	●	●
4-path ultrasonic measurement (special request)		●	●		
Dimension					
DN 50 2"	●	● ²⁾		●	●
DN 65 2½"	●	● ²⁾		●	●
DN 80 3"	●	● ²⁾		●	●
DN 100 4"	●	●	● ¹⁾	●	●
DN 125 5"	●	●	● ¹⁾	●	●
DN 150 6"	●	●	● ¹⁾	●	●
DN 200 8"	●	●	●	●	●
DN 225 9"	●	●	●	●	●
DN 250 10"	●	●	●	●	●
DN 300 12"	●	●	●	●	●
DN 350 14"		●	●	●	●
DN 400 16"		●	●	●	●
DN 500 20"		●	●	●	●
DN 600 24"		●	●	●	●
DN 700 28"		● ²⁾	●	●	●

X = can be used, XX = often used, XXX = most often used, ● = available

¹⁾ SONOKIT 1-path DN 100 to DN 2400 and 2-path DN 200 to DN 4000

²⁾ Only available as PVR (product variation request - special request)

Please see Product selector on the Internet, since some constraints might be related to some of the features:
www.pia-selector.automation.siemens.com



	SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380
	7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...
Dimension (continued)					
DN 800	32"	● ²⁾	●	●	●
DN 900	36"	● ²⁾	●	●	●
DN 1000	40"	● ²⁾	●	●	●
DN 1200	48"	● ²⁾	● ⁵⁾	●	●
DN 1400 ... 4000	54" ... 160"		● ^{1) 5)}		
Process connection					
Flanges	●	●		●	●
Flangeless (for weld-in)		●			
Flanges Norm					
EN 1092-1	●	●		●	●
EN 1759-1	●	●			
ANSI B16.5		●			
Pressure rating					
PN 6			●		
PN 10	●	●	●		
PN 16	●	●	●	●	●
PN 25		●	●	●	●
PN 40	●	●	●	●	●
Class 150	●	●			
Class 300	●	●			
Pipe, flange and transducer material					
Carbon steel	●	●	●	●	●
Stainless steel		on request	●		
Die cast bronze				●	●
Other materials		on request	on request		
Media temperature					
°C	°F				
-20	-4		●		
-10	+14	●	●		
+2	+35.6	●	●	● ⁶⁾	●
+60	+140	●	●	●	●
+120	+248	●	●	● ³⁾	● ³⁾
+150	+302	●	●	● ⁴⁾	● ⁴⁾
+160	+320	●	●	●	●
+190	+374		●	●	●
+200	+392		●	●	●
Measuring principle					
Transit time principle	●	●	●	●	●

● = available

- 1) SONOKIT 1-path DN 100 to DN 2400 and 2-path DN 200 to DN 4000
- 2) Only available as PVR (product variation request - special request).
- 3) Compact
- 4) Pipe material bronze brass
- 5) SONOKIT with FUS080 up to DN 1200
- 6) Min. 5 °C (41 °F)

Flow Measurement

SITRANS F US Inline

System information SITRANS F US

Please see **Product selector on the Internet**, since some constraints might be related to some of the features:
www.pia-selector.automation.siemens.com



**SONO 3300/
FUS060**

**SONO 3100/
FUS060**

**SONOKIT/
FUS060
FUS080**

FUE380

FUS380

7ME3300...

7ME3100...

**7ME3210.../
7ME3220...**

7ME3410...

7ME3400...

Approvals

Custody transfer approval

MID, MI-004, EN 1434
(European energy meter standard)

Other country-specific type approval available for:

- Russia

- China

Ex approval

Ex d ATEX

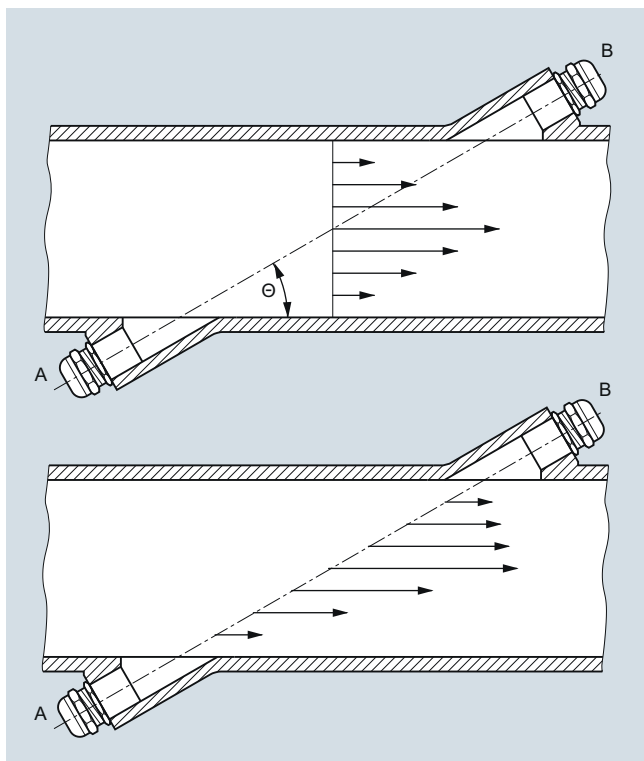
Ex i ATEX

● = available

				●	
	●	●	●	●	●
				●	
		●	●		
	●	●	●		

Function

Physical principle



Velocity distribution along sound path

A sound wave traveling in the same direction as the liquid flow arrives at point B from point A in a shorter time than the sound wave traveling against the direction of flow (from point B to A). The difference in sound transit time indicates the flow velocity in the pipe.

Since delay time is measured at short intervals both in and against flow direction, viscosity and temperature have no influence on measurement accuracy.

Measuring principle

In SITRANS F US flowmeters the two ultrasonic transducers are placed at an angle θ in relation to the pipe axis. The transducers function as transmitters and receivers of the ultrasonic signals. Measurement is performed by determining the time the ultrasonic signal takes to travel with and against the flow. The principle can be expressed as follows:

$$v = K \cdot (t_{B,A} - t_{A,B}) / (t_{A,B} \cdot t_{B,A}) = K \cdot \Delta t / t^2$$

v = Average flow velocity

t = Transit time

K = Proportional pipe geometry factor

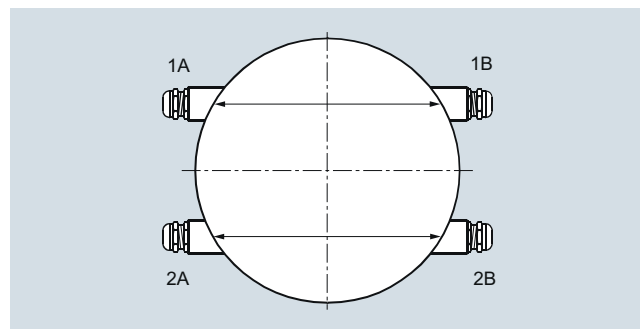
This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature.

Proportional factor K is determined by wet calibration.

Direct signal processing

The ultrasonic signal is sent directly between the transducers. The advantage gained sending signals from point to point is an extremely good signal strength.

2-path solution



Ultrasonic 2-path flowmeter with 4 transducers. In the upper path transducers 1A / 1B and in the lower path 2A / 2B are displayed.

The accuracy of ultrasonic flowmeters depends on the pipe geometry before and after the flowmeter and the number of ultrasonic measuring paths.

When water flows through a pipe, it has a tendency to swirl and/or flow with different velocities inside the pipe, depending on the pipe design.

A 2-path ultrasonic flowmeter offers:

- less sensitivity to upstream obstruction like bends, pumps or valves.
- high security in the measurements as the meter continues to measure even if, for some reason, one path stops working.

Typical straight inlet requirements are upstream $10 \times D_i$ (D_i = diameter of the flowmeter) and downstream $3 \times D_i$.

Typical accuracy that can be reached with 2-path ultrasonic flowmetering is $\pm 0.5\%$ with installations according to above demands.

4-path ultrasonic flowmeters

Some applications require accuracy under extreme short inlet conditions and swirl that cannot be obtained with 2-path solutions.

For these applications we can offer a 4-path solution – customer-specified – according to actual inlet conditions.

Please contact Siemens Flow Instruments for specific applications.

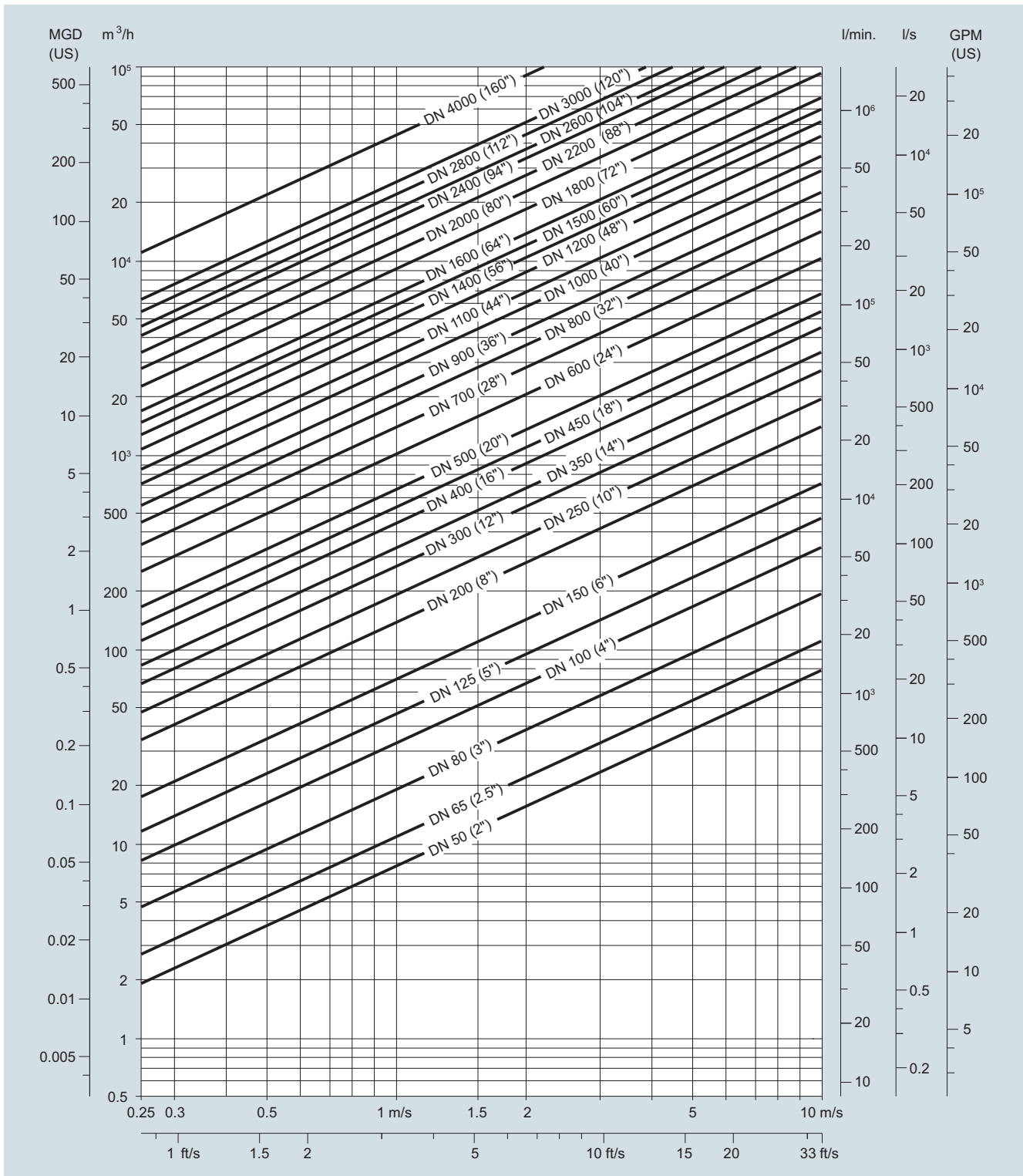
Flow Measurement

SITRANS F US Inline

System information SITRANS F US

Technical specifications

3



Nominal size and flow

Guidelines for selection of sensor

- Min. measuring range: 0 ... 1 m/s
- Max. measuring range: 0 ... 10 m/s

Nominal flow velocity:

- Normal: 1 ... 3 m/s
- Minimum: not permanently below 0.5 m/s
- Maximum: up to 8 m/s

Flow velocity calculation formula:

- $v = (4 \times Q_{max}) / (\pi \times D_i^2 \times 3600)$
- v in m/s, Q_{max} in m³/h, D_i in m

Additional to the flow velocity check it is recommended to observe the Reynolds number (Re):

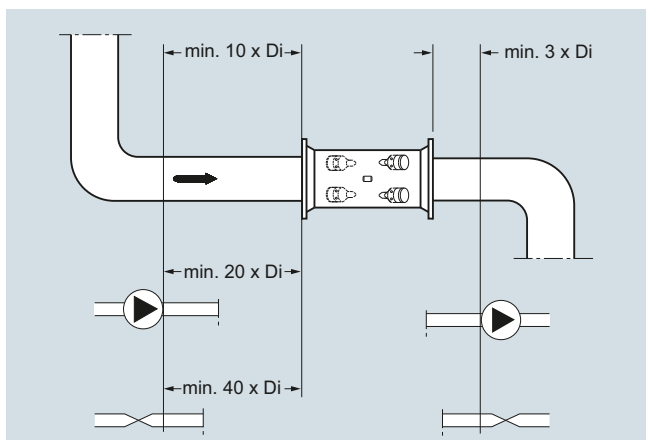
The optimal performance of the flowmeter is with a Re above 10 000, which is typical for flow velocities (water) above 0.5 m/s. Avoid an Re value between 2000 and 5000. In order to observe this and to be above the recommended 0.5 m/s flow velocity limit the sensor size must be reduced.

Re formula: $Re = V \times D_i / \text{Viscosity}$

V in m/s, D_i in m, Viscosity in cSt ($\times 10^{-6} \text{ m}^2/\text{s}$)

Example: Viscosity for water at 20 °C = $1 \times 10^{-6} \text{ m}^2/\text{s}$

Inlet and outlet conditions



Recommended inlets and outlets

To maximize performance inlet and outlet must be straight. There must be a certain distance between flowmeter and bends, pumps and valves. It is also important to centre the flowmeter in relation to pipe flanges and gaskets.

Valves must always be installed after the flowmeter. The only exception is installation of the sensor in a vertical pipe. In this case a valve below the sensor is necessary to allow zero point adjustment. It is important to select a valve which does not alter the flow when fully open.

Recommended inlet/outlet	SONO 3300, SONO 3100, SONOKIT 2-path	FUS380/FUE380 ¹⁾	SONOKIT 1-path
90° bend	10 x D_i	10 x D_i	20 x D_i
Fully opened valve	10 x D_i	10 x D_i	20 x D_i
Partially opened valve	40 x D_i	40 x D_i	40 x D_i
2 x 90° bends in same plane	15 x D_i	15 x D_i	25 x D_i
2 x 90° bends in two planes	20 x D_i	20 x D_i	40 x D_i
Reductions (Outlet 0 x D_i)	10 x D_i	10 x D_i	20 x D_i
Pumps	20 x D_i	20 x D_i	40 x D_i
Outlet	3 x D_i	3 x D_i	3 x D_i

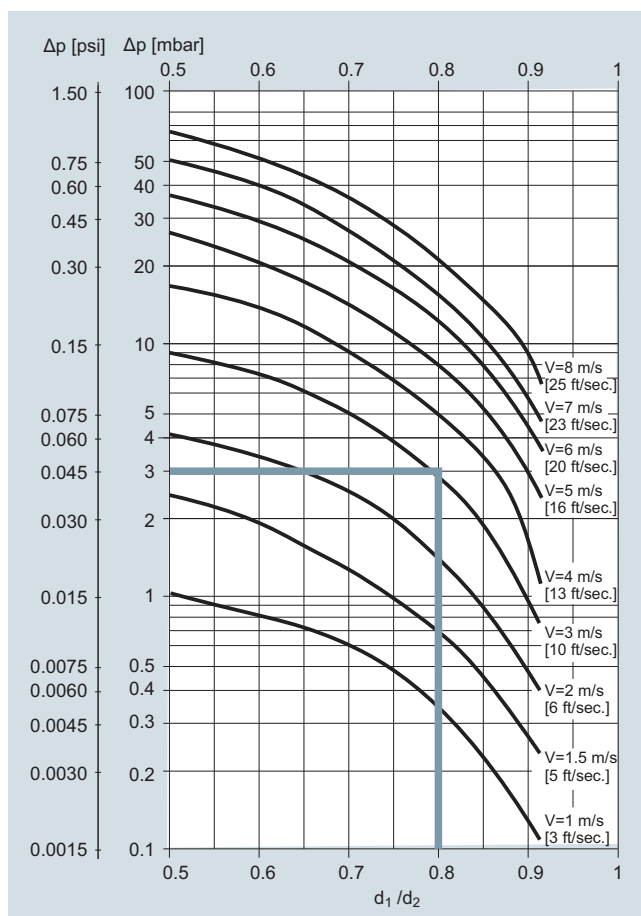
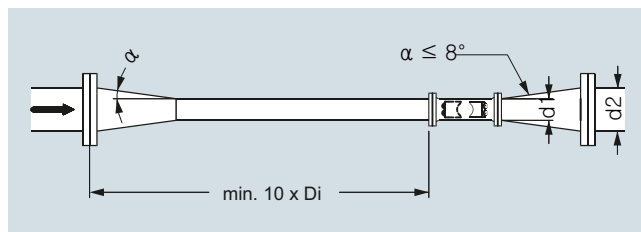
¹⁾ Inlet for FUE380 with MID approval should be for sizes \geq DN 80: 1.5 m

Reductions

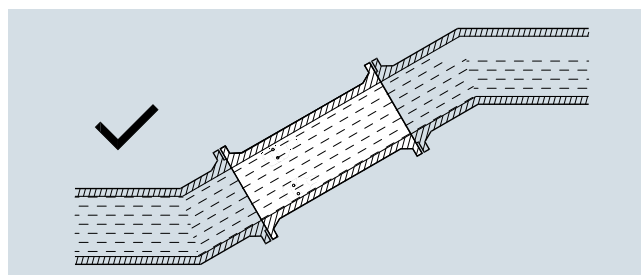
The flowmeter can be installed between two reducers (e.g. DIN 28545). At 8° the pressure drop curve below applies.

Example:

A flow velocity of 3 m/s (V) in a sensor with a diameter reduction from DN 250 to DN 200 ($d_1/d_2 = 0.8$) gives a pressure drop of 3 mbar.



The sensor must always be completely filled with liquid:



The following installations must be avoided:

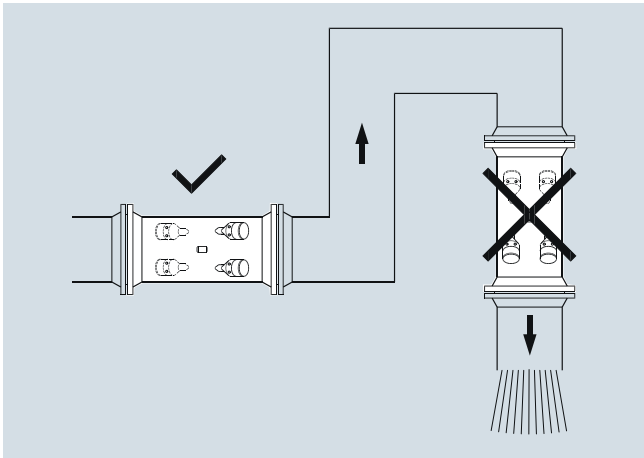
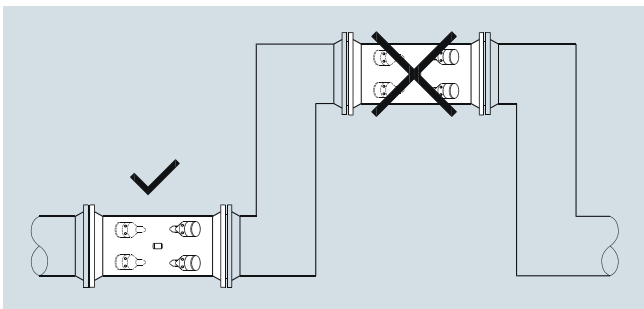
- Installation at the highest point of the pipe system
- Installation in vertical pipes with free outlet

Flow Measurement

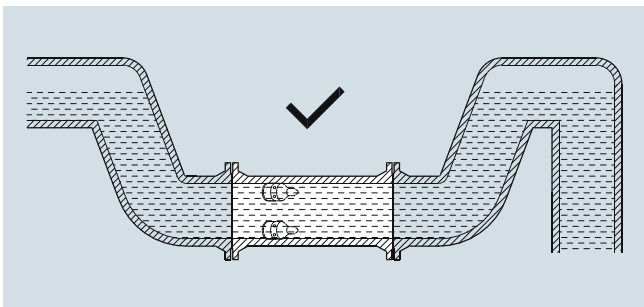
SITRANS F US Inline

System information SITRANS F US

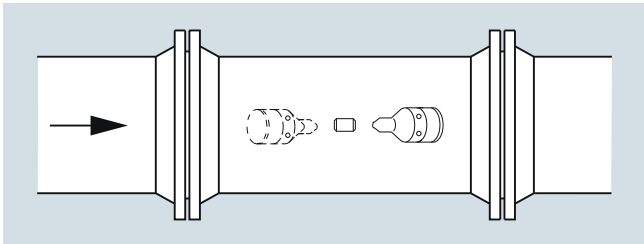
3



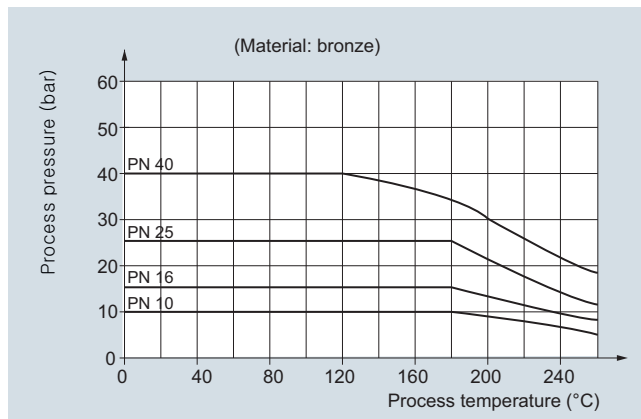
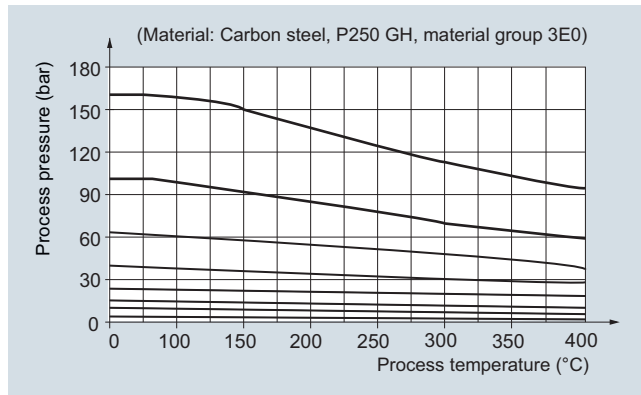
With partially full pipes or pipes with free outlet the flowmeter should be located in a U-shaped tube:



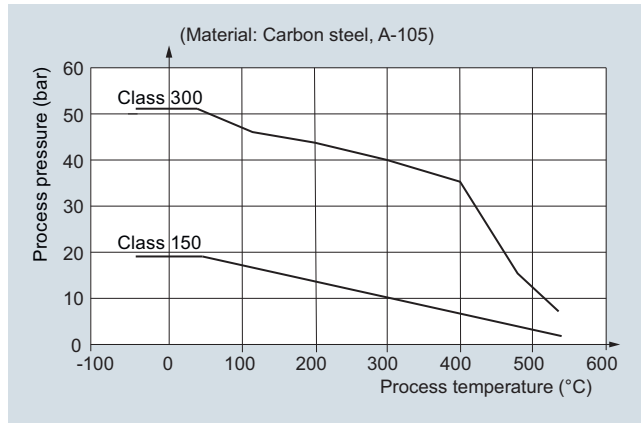
Installing the transducers in horizontal position is recommended:



Pressure/temperature curve to EN (DIN) flanges



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure/temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 9/6.

Reference conditions

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

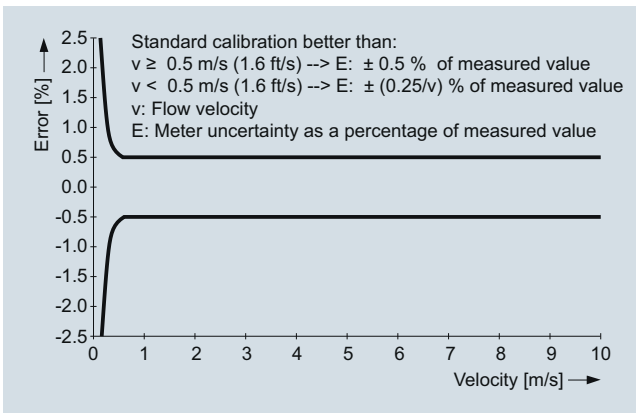
Therefore the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

Siemens offer accredited calibrations assured to ISO 17025. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

Flowmeter calibration data are stored in the internal EEPROM of the transmitters FUS060 or FUS080.

The system accuracy refers to the following systems:

SONO 3300/FUS060, SONO 3100/FUS060¹⁾ which are typically calibrated on the frequency output.



Typical calibration reference conditions:

Fluid	Water
Fluid temperature	$22 \pm 5 \text{ }^\circ\text{C}$
Ambient temperature	$22 \pm 5 \text{ }^\circ\text{C}$
Supply voltage	115/230 V AC +10 ... -15 % 24 V DC +25 ... -15 %, 24 V AC $\pm 15 \%$
Straight inlet length	$20 \times D_i$
Outlet	$3 \times D_i$
Rangeability	0 ... 1 m/s to 0 ... 10 m/s
Repeatability	Better than 0.25 % in the range 0.5 ... 10 m/s
Linearity (for water)	
• Reynolds number $1000 < Re < 5000$	Better than 1 %
• Reynolds number > 5000	Better than 0.5 %

¹⁾ Only systems with transmitter FUS060. For systems with transmitter FUS080 see chapter on FUS380 and FUE380.

Additional effects of deviations from reference conditions

- Current output: As frequency output ($\pm 0.1 \%$ of actual flow +0.05 % FSO)
- Effect of ambient temperature: Frequency/pulse output: $< 0.005 \% \text{ SPAN/K}$; Current output: $< \pm 0.0075 \% \text{ SPAN/K}$
- Effect of supply voltage: 0.005 % of measuring value at 1 % change

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

Overview



SITRANS FUS060 is a transit time based transmitter designed for ultrasonic flowmetering with dedicated sensors in the FUS inline series up to DN 4000. SITRANS FUS060 is engineered for high performance and is suitable for 1-path, 2-path and 4-path flowmeters.

Benefits

- Superior signal resolution for optimum turn down ratio
- Simple menu-based local operation with two-line display and four optical input elements, for unlimited use in potentially explosive atmospheres
- Self-monitoring and diagnostic
- Operate up to 4 paths
- ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3
- Remote installation up to 120 m from sensor
- 1 analog output (4 to 20 mA) standard with HART-protocol, 1 digital frequency or pulse output, 1 relay output for limit, alarms, flow direction
- PROFIBUS PA Profile 2, 1 digital frequency or pulse output

Design

The transmitter type FUS060 is designed for remote installation in non-hazardous or hazardous areas.

The transmitter is designed for use in a flowmeter system together with sensors type SONOKIT, SONO 3300 and SONO 3100.

The FUS060 is ordered as part of a complete flowmeter system. It can be ordered separately as spare part and manually programmed with the sensor data.

Application

The main application for flowmeters with the transmitter SITRANS FUS060 is measurement volume of flow within the general, petrochemical and chemical industries, power engineering and water and waste water, as well as various types of oils and liquid gases.

Integration

The transmitter output is often used as input for an automation system or as input for systems of remote reading.

The SITRANS FUS060 transmitter offers current, pulse and relay outputs as standard output functions and supports HART or Profibus PA communication.

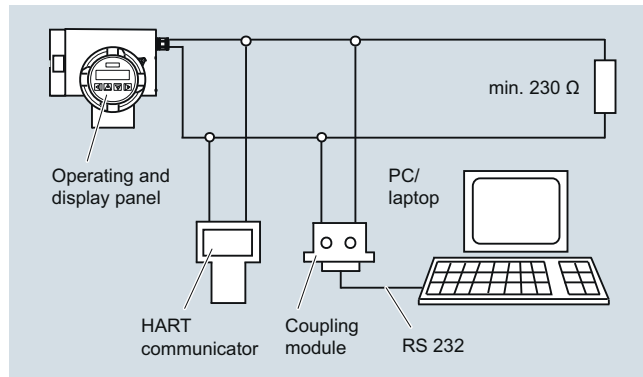
The settings of the transmitter output functions are individually programmed via keypad and display menu.

Function

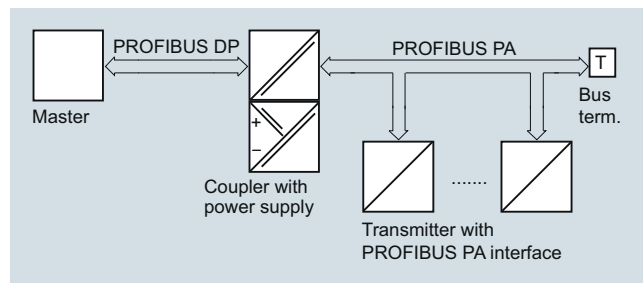
Displays and keypad

Operation of the SITRANS FUS060 transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS PA communication

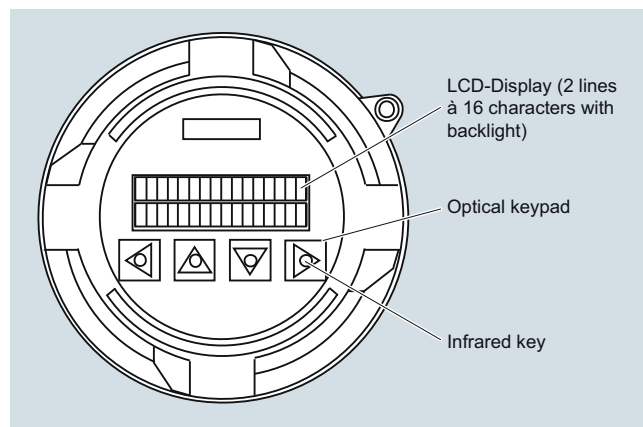


HART communication



PROFIBUS PA communication

The operating and display panel permits simple operation without supplementary equipment. It is not necessary to open the housing. All changes to a setting can therefore also be carried out in the potentially explosive atmosphere.



Operating and display panel

The individual functions and parameters are selected using a hierarchical, multi-language input menu and four infrared keys. The parameters can be specifically selected and modified using codes, e.g.:

- Operating parameters such as measuring range, physical dimensions, device information
- Limits for flow, totalizer, ultrasonic velocity or ultrasonic amplitude
- Noise suppression using damping, error stages and hysteresis
- Display parameters (freely-configurable display)
- Display in volume or mass dimensions
- Density as constant input value for conversion of volume into mass dimensions
- Forward/backward measurement
- Flow direction
- Diagnostics functions and control values
- Functions of the PROFIBUS PA output: flow, net quantity (volume or mass), ultrasonic velocity, ultrasonic amplitude, forward quantity (volume or mass), backward quantity (volume or mass)
- Functions of the analog output: flow, ultrasonic velocity or ultrasonic amplitude
- Functions of digital output 1: pulse output, frequency output, limit, flow direction or device status
- Functions of digital output 2: limit, flow direction or device status
- Simulation of output signal via analog output, digital output 1 and digital output 2

The HART protocol is implemented via the analog output (current output). Using this communication facility, the device can be parameterized with a PC/laptop and SIMATIC PDM software in addition to local operation.

In the version with PROFIBUS PA, the analog output is replaced by the digital PROFIBUS PA output. The device can then be parameterized via PROFIBUS communication and with SIMATIC PDM in addition to local operation.

Technical specifications

Input

Measurement	Flow by measuring the transit time difference of ultrasonic signals through ultrasonic transducers in DN 100 ... 4000 2-path sensor pipes (optional, depending on selected size, 1-path or 4-path special solutions are possible).
Nominal diameters and number of paths	2-path DN 100 ... DN 4000 (optionally also 1-path and 4-path, depending on size (DN 25 ... DN 4000))
Max. cable length	120 m (395 ft) (shielded coaxial cable). For Ex version the transducer cable length is restricted to 3 m (9.84 ft) in order to meet requirements for electrical immunity. For 2-path and 4-path systems with sizes \geq DN 3000 cable length is restricted to 30 m (98.4 ft).

Output

Function	Current output programmable for flow, sound velocity or amplitude level.
Analog output	Active current output (13.2 V < open loop voltage < 15.8 V) 4 ... 20 mA
<ul style="list-style-type: none"> • Signal range • Upper limit • Signal on alarm • Load 	20 ... 22.5 mA, adjustable 3.6 mA, 22 mA, or 24 mA Max. 600 Ω ; for non Ex version \geq 230 Ω for HART communication \leq 330 Ω for Ex-version
<ul style="list-style-type: none"> • Only PROFIBUS PA version: 	Analog output omitted, is replaced by digital PROFIBUS PA interface

Digital output 1

Function	Pulse, frequency or status output - programmable for pulses, frequency, alarm, limit or status.
<ul style="list-style-type: none"> • Active or passive signal, can be configured with positive or negative logic 	Active: 24 V DC, \leq 24 mA, $R_f = 300 \Omega$ Passive: open collector, 30 V DC, \leq 200 mA
<ul style="list-style-type: none"> • For explosion protection (ATEX version) and PROFIBUS PA version 	Only passive: open collector 30 V DC, \leq 100 mA
<ul style="list-style-type: none"> • Output function, configurable 	Pulse output <ul style="list-style-type: none"> • Adjustable pulse significance \leq 5000 pulses/s • Adjustable pulse width \geq 0.1 ms Frequency response <ul style="list-style-type: none"> • f_{END} selectable up to 10 kHz Limit for flow, totalizers, ultrasonic velocity or ultrasonic amplitude device status, flow direction

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

Digital output 2

Function	Relay output - programmable for alarm, limit or status indication. Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, $R_i = 9 \Omega$
• Relay, NC or NO contact	
• For explosion protection (ATEX version)	Max. 30 V DC, max. 100 mA DC, 50 mA AC (cf. EC-Type Examination certificate)
• Output function, configurable	Limit for flow, ultrasonic velocity or ultrasonic amplitude flow direction device status
• Only PROFIBUS PA version:	Digital output 2 omitted

Communication via analog output 4 ... 20 mA

• PC/laptop or HART communicator with SITRANS F flowmeter	
- Load with connection of coupling module	min. 230 Ω (max. 330 Ω for Ex-version)
- Load with connection of HART communicator	min. 230 Ω
- Cable	2-wire shielded ≤ 3 km (≤ 1.86 miles) Multi-core shielded ≤ 1.5 km (≤ 0.93 miles)
- Protocol	HART, version 5.1

Communication via PROFIBUS PA interface

• Power supply	Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 61158/EN 50170
• Current consumption from bus	Separate supply, four-wire device Permissible bus voltage 9 ... 32 V See certificates and approvals 10 mA; ≤ 15 mA in event of error with electronic current limiting

Electrical isolation

Outputs electrically isolated from power supply and from one another

Accuracy

Error in measurement (at reference conditions)	
• Pulse output	$\leq \pm 0.5$ % of measured value at 0.5 ... 10 m/s or $\leq \pm 0.25 \sqrt{V}$ [m/s] % of measured value at flow < 0.5 m/s
• Analog output	As pulse output plus ± 0.1 % of measured value, $\pm 20 \mu\text{A}$
• Repeatability	$\leq \pm 0.25$ % of measured value at 0.5 ... 10 m/s
Reference conditions (water)	
• Process temperature in the connected sensor	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Ambient temperature at the transmitter	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Transmitter warming-up time	30 min.
Installation conditions of connected sensor	Upstream section > 10 x DN and downstream section > 5 x DN

Rated operation conditions

<u>Ambient conditions</u>	
Ambient temperature	
• Operation	-20 ... +50 °C (-4 ... +122 °F) Observe temperature classes
• In potentially explosive atmospheres	
• Storage	-25 ... +80 °C (-13 ... +176 °F) IP65 (NEMA 4)
Enclosure rating	For use in industrial environments
Electromagnetic compatibility	To EN 55011/CISPR-11
• Emitted interference	To EN/IEC 61326-1 (Industry)
• Noise immunity	The measuring media must be ultrasonic signal compatible. It must be homogeneous and not two-phased to transfer the acoustic ultrasonic signals.
<u>Medium conditions</u>	
• Process temperature	-200 ... +250 °C (-328 ... +482 °F) (not directly influenced by medium temperature)
• Gases/solids	Influence accuracy of measurement (approx. max. 3 % gases or solids)

Design

Separate version	Transmitter is connected to the transducers via 3 ... 120 m (9.8 ... 395 ft) long specially shielded cables (coaxial cable) For ATEX versions mounted in the Ex area only with 3 m (9.8 ft) long cables.
Enclosure material	Die-cast aluminum, painted
Wall mounting bracket (standard and special)	Stainless steel (standard: always incl.)
Weight of transmitter	4.4 kg (9.7 lb)
Electrical connection	Cable glands (always incl.) • Power supply and outputs - 2 x M20 (HART)/M25 (PROFIBUS) or - 2 x 1/2"-NPT (HART) • Transducers/sensor - 2/4 x M16 or - 2/4 x 1/2" NPT

Displays and controls

Display	LCD, two lines with 16 characters each
• Multi-display:	Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information
2 freely-selectable values are displayed simultaneously in two lines	
Operation	4 infrared keys, hierarchical menu shown with codes

Power supply

Supply voltage	
• Standard version	120 ... 230 V AC \pm 15 % (50/60 Hz) or 19 ... 30 V DC/ 21 ... 26 V AC
• Ex version	19 ... 30 V DC/21 ... 26 V AC
Power failure	No effect for at least 1 period (> 20 ms)
Power consumption	Approx. 10 VA/10 W

Certificates and approvals

Explosion protection	ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 T6 for media < 85 °C (185 °F) T5 for media < 100 °C (212 °F) T4 for media < 135 °C (275 °F) T3 for media < 200 °C (392 °F)
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Coaxial cable

Standard Coaxial cable (75 Ω)

Coaxial cable with SMB straight plug on one end for connection to the FUS060



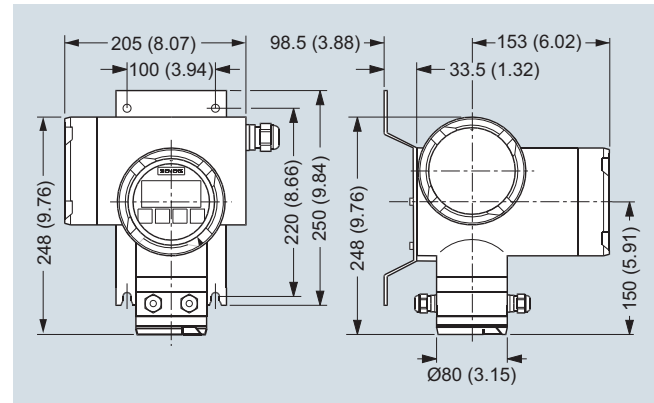
Outside diameter	Ø 5.8 mm
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter
Material (outside jacket)	black PE
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)

High temperature Coaxial cable (75 Ω)

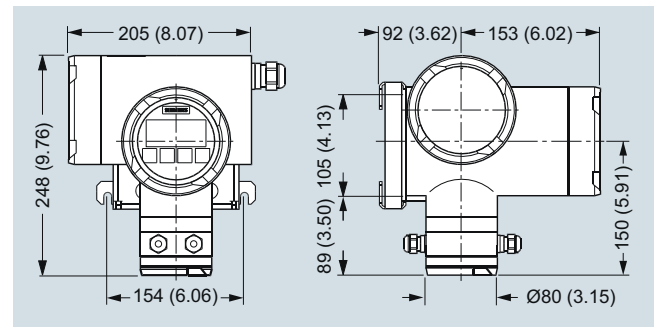
Coaxial cable with SMB straight plug on one end for the connection to FUS060

Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max 3 m 9.84 ft) transducer cable length for Ex area mounted transmitters)
Material (outside jacket)	Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)

Dimensional drawings

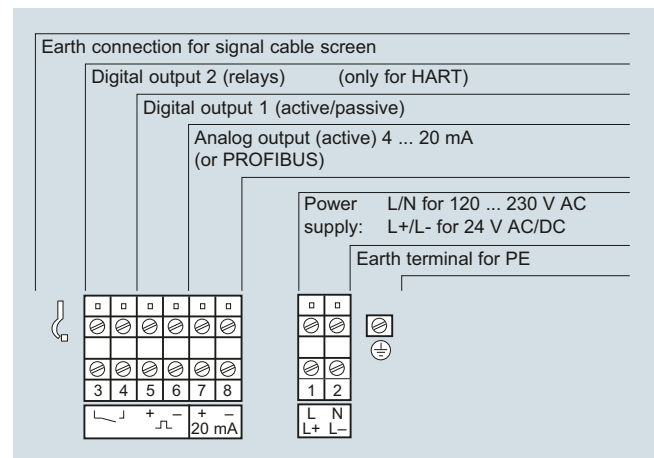


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



SITRANS FUS060 with optional special mounting bracket, dimensions in mm (inch)

Schematics



Electrical connection SITRANS FUS060

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

Transmitter FUS060 operating instructions, accessories and spare parts


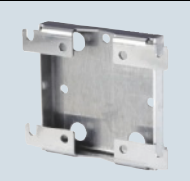

Operating instructions

Description	Article No.
• English	A5E01204521
• German	A5E02123845

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.	
Standard wall mounting bracket	7ME5933-0AC04	
Special wall-/pipe mounting bracket kit	7ME5933-0AC05	
Safety clamp for electronic cover with glass plate (7ME5933-0AC01)	7ME5933-0AC06	

Process Device Manager SIMATIC PDM

SIMATIC PDM

Details about the SIMATIC PDM tool can be found on page 8/11, chapter "Communication and Software"

See page 8/18, chapter "Communication and Software"



HART modem for communication with FUS060 HART, PC and SIMATIC PDM

HART modem


With USB connection














7MF4997-1DB

Spare parts

SITRANS FUS060 transmitter, available standard and Ex versions

The transmitter configuration is made in the flowmeter Order codes (together with the sensors). The information below is for spare part ordering only and with fixed standardized pre-settings for a DN 2000 2-path system.

Description	Version	Enclosure	Supply	Article No.	
FUS060, 230 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1BA1	
FUS060, 230 V, HART, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1BA2	
FUS060, 230 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1DA1	
FUS060, 230 V, PROFIBUS, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1DA2	
FUS060, 24 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	7ME3050-2BA20-1BA1	
FUS060, 24 V, HART, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	7ME3050-2BA20-1BA2	
FUS060, 24 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	7ME3050-2BA20-1DA1	
FUS060, 24 V, PROFIBUS, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	7ME3050-2BA20-1DA2	
FUS060, ATEX, 24 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4) ATEX approval	19 ... 30 V DC/ 21 ... 26 V AC	7ME3050-2BA21-1CA1	

Description	Article No.		Description	Article No.	
Operating/Display module	7ME5933-0AC00		M20 cable gland set for FUS060 ATEX version power and output connection, PA plastic, 1 x in blue (ATEX Ex i) and 1 x gray (ATEX Ex-e) • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +95 °C (-4 ... +203 °F)	A5E02246356	
Electronics cover with glass plate (non Ex) . Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC01		1/2" NPT cable gland set for FUS060 (NPT) power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	A5E02246396	
Cover for sensor cable and gasket. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC02		M25 cable gland set for the FUS060 PA (M25) power and output connection, gray PA plastic, 2 pcs. • cables Ø 9 ... 16 mm (0.35" ... 0.63") • -40 ... +100 °C (-40 ... +212 °F)	A5E02246378	
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC03		M16x1.5 cable gland set for FUS060 (M16) sensor connection, gray PA plastic, 2 pcs. and 2 pcs. blind. • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -40 ... +100 °C (-40 ... +212 °F)	A5E02593526	
FUS060 Sensor connection PCBA, Standard versions only, 1 pc.	A5E02551331		M16 x 1.5 cable gland set for FUS060 (M16) sensor connection, brass chrome, 2 pcs. and 2 pcs. blind • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +105°C (-4 ... +221 °F)	A5E02246369	
FUS060 Sensor connection PCBA, ATEX version only, 1 pc.	A5E02551334		1/2" NPT cable gland set for FUS060 (NPT) sensor connection, 4 pcs. M16 bush to 1/2" NPT and 4 pcs. 1/2" NPT gray PA plastic glands • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +100 °C (-4 ... +212°F)	A5E02247877	
M20 cable gland set for FUS060 (M20) power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	A5E02246350				

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

Cables for FUS060

Description	Length m (ft)	Article No.
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101
	15 (49.21)	A5E00861432
	30 (98.43)	A5E01278662
	60 (196.85)	A5E01278682
	90 (295.28)	A5E01278687
	120 (393.70)	A5E01278698
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω)	3 (9.84)	A5E00875105
	15 (49.21)	A5E00861435
	30 (98.43)	A5E01196952
Special coaxial cable sets for low temperature cryogenic systems; with SMB plug for transmitter SITRANS FUS060, PTFE material, temp. -200 ... +200 °C (-328 ... +392 °F), impedance 75 Ω (2 pcs.)	10 (32.84)	A5E02085593
	15 (49.21)	A5E03262088
	30 (98.43)	A5E02085644
	40 (131.23)	A5E02085649



Overview



SITRANS FUS080 is a transit time based transmitter designed for ultrasonic flowmetering with any sensor in the FUS inline series SONOKIT, FUS380 and FUE380 up to DN 1200.

The ultrasonic flowmeter transmitter SITRANS FUS080 comes as battery or mains powered version. The SITRANS FUS080 is designed to measure flow water applications.

The SONOKIT retrofit flowmeter series are shown from page 3/273. The standard flowmeter series SITRANS FUS380 is described from page 3/284. The type approved flowmeter series for flowmetering in energy meter custody transfer systems are named SITRANS FUE380 - see page 3/289.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one button straight forward display
- IrDA optical interface for local communication
- 2-path measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanic isolated digital outputs for easy connection to a calculator (potential free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i (min) : Q_s (max) up to 1:400

Application

The main application for flowmeters with the transmitter SITRANS FUS080 is measurement of water flow in district heating plants, local networks, boiler stations, substations, chiller plants, irrigations plants and other general water applications.

Design

The transmitter type SITRANS FUS080 is designed with fiber-glass reinforced polyamide enclosure for remote or compact installation in normal areas. The remote versions are available with up to 30 meter distance from flowmeter to transmitter. When ordering as a compact version in the series FUS380 and FUE380 the transducer cables are pre-mounted at the sensor.

The transmitter is available in an IP67/NEMA 4X/6 enclosure and is designed for use in the flowmeters series:

- SONOKIT (1-path or 2-path)
- FUS380 (2-path)
- FUE380 (2-path)

The transmitter FUS080 is always ordered as part of a complete flowmeter system.

It can be manually ordered separately as spare part preprogrammed with the given sensor data.

Integration

The flowmeter pulse output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUS380 has two pulse outputs, with functions that can be individually selected.

The settings of the transmitter, eg. flow and pulse output rate, are defined when ordering the complete flowmeter.

If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except eventually local approvals on the flowmeter.

Technical specifications

Input	
Measurement	Flow by measuring the transit time difference of ultrasonic signals through ultrasonic transducers in the sensor pipes. Supporting of 1-path or 2-path sensors in sizes DN 50 ... 1200 measuring on water.
Measuring rate	
• Battery mode	0.5 Hz
• Mains supply	Up to 15 Hz
• Back-up mode	0.5 Hz (at mains supply drop)
Flow rate	0.02 ... 9 m/s (0.065 ... 29.5 ft/s), bidirectional flow metering
Output	
Max. pulse frequency	100 Hz at Q_s (Q_{max})
Pulse value and length	Selectable with the ordering of the flowmeter
Output A function	Pulse: forward, reverse, forward net, reverse net (preset: forward)
Output B function	Pulse: forward, reverse, forward net, reverse net (preset: forward) or alarm indication or call-up indication (preset: alarm)
Pulse value A and B	0.1 l/p, 0.25 l/p, 0.5 l/p, 1 l/p, 2.5 l/p, 10 l/p, 25 l/p, 50 l/p, 100 l/p, 250 l/p, 500 l/p, 1 m ³ /p, 2.5 m ³ /p, 5 m ³ /p, 10 m ³ /p, 25 m ³ /p, 50 m ³ /p, 100 m ³ /p, 250 m ³ /p, 500 m ³ /p, 1 000 m ³ /p
Pulse length (depending on Q_{max} by DN selection)	5, 10, 20, 50, 100, 200, 500 ms (standard 5 ms)
Alarm indication	Path 1 (F1), path 2 (F2) internal, failure (F3, F4), powers supply warning or low battery indication (F5), Q_{max} overflow (F6), pulse overflow (F7, F8), internal data logger warning (F9)

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080

Rated operation conditions

Ambient conditions

Ambient temperature

- Operation -10 ... +60 °C (14 ... 140 °F) (MID version: max. +55 °C (131 °F))
- Storage -40 ... +85 °C (-40 ... +185 °F) (battery included)

Enclosure rating

IP67/NEMA 4X/6 to EN 60529 and DIN 40050

Electromagnetic compatibility

- Emitted interference To EN 55011/CISPR-11
- Immunity To EN/IEC 61326-1 (Industry)
- MID approved (FUE380 series) Environment class E2 and M1

Mechanical vibration

2 g, 1 ... 800 Hz sinusoidal in all directions according to IEC 68-2-6

Weight of transmitter

Approx. 1.5 kg (3.3 lb)

Design

Enclosure material

Fibre-glass reinforced polyamide, light gray color

Wall mounting kit

IP67/NEMA 4X/6 terminal box for the wall mounting of the transmitter, fiber-glass reinforced polyamide with stainless steel bracket, cable glands entries: 2 x 2 M20 or PG 13.5 for power supply and outputs and 2 x M20 or PG 13.5 for the sensor cables, glands (supply and outputs and double cable entries for sensor cables) are included.

Sensor cable

Coaxial cable sets for remote transmitter up to 30 m (98.4 ft) long transducer cable, 75 Ω impedance, cables sets are prepared for the connection to the sensors

Display and controls

Display

LCD, 8 digits, additional 2 digits and symbols for status information

Resolution

Totalized information can be displayed with 1, 2 or 3 decimals or automatic adjustment (default)

Display setting

Flow unit: Preset: m³/h
Volume unit: Preset: m³

Push button

One push button for menu selection and display information

Communication (IrDA optical eye)

IrDA – optical communication and control interface with Modbus RTU protocol for read or write transmitter settings and data via PC and PDM tool

Power supply

Battery

D-cell battery pack, 3.6 V LiSOCl (Lithium Thionyl Chloride, 32 Ah), replaceable, life- and working-time up to 6 years

Mains

87 ... 265 V AC (50 ... 60 Hz) or 87 ... 265 V AC (50 ... 60 Hz) with D-cell single battery backup, 2.6 V LiSOCl (Lithium Thionyl Chloride, 12.5 Ah), replaceable, life time up to 8 years

Power consumption

Mains version

Approx. 2.5 VA

SONOKIT, FUS380, FUE380

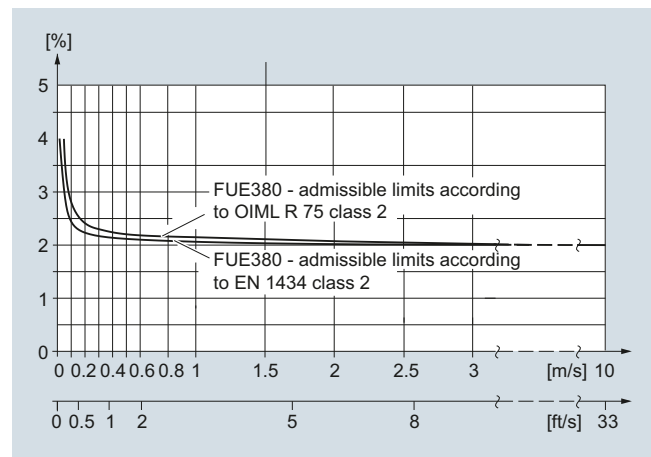
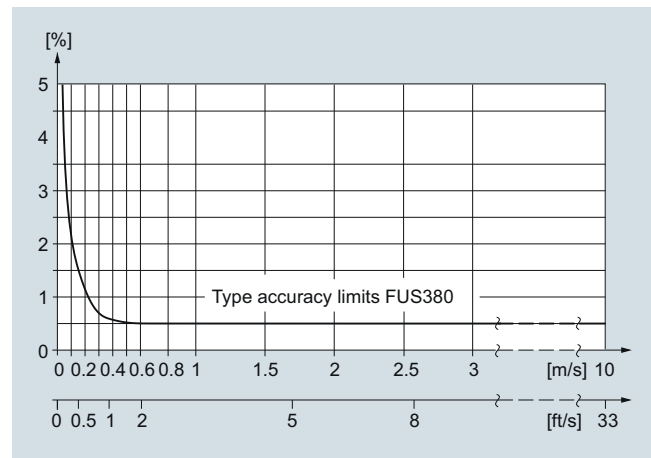
The flow values and settings are predefined according to dimension selection.

The transmitter settings are changeable by using the SW tool PDM (for FUE380 series some of the setting are only readable, restriction of the approval requirements).

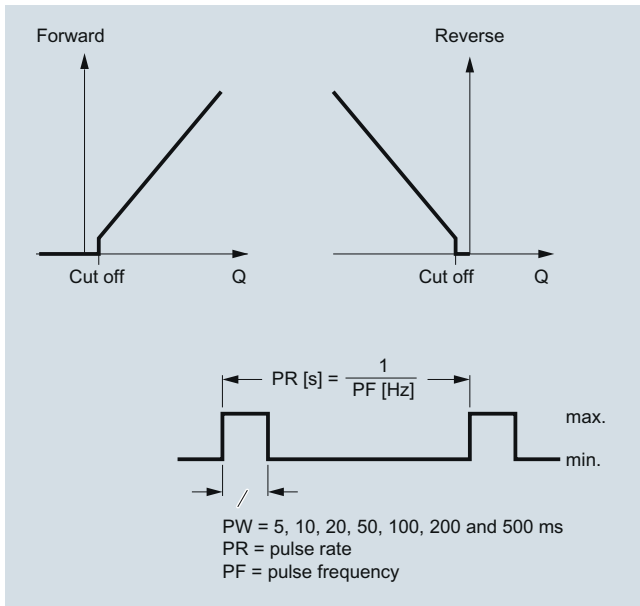
Accuracy/Error in measurement:

(at reference conditions for FUS380 and FUE380 series, SONOKIT series will differ in the accuracy)

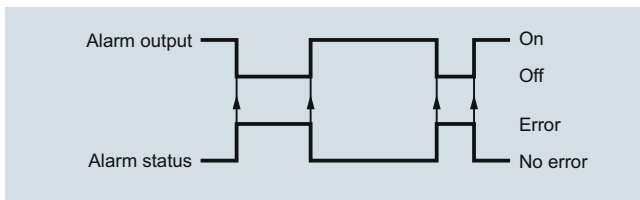
- Pulse output
 - $\leq \pm 0.5$ % of measured value at 0.5 ... 10 m/s or
 - $\leq \pm 0.25/V$ [m/s] % of measured value at flow < 0.5 m/s
- Repeatability ≤ 0.25 % of measured value at 0.5 ... 10 m/s
- Reference conditions
 - Process temperature and ambient temperature: 25 °C \pm 5 °C (77 °F \pm 9 °F)
 - Transmitter warming-up time 30 min.
 - Installation conditions of the sensor: Upstream section > 10 x DN and downstream section > 5 DN



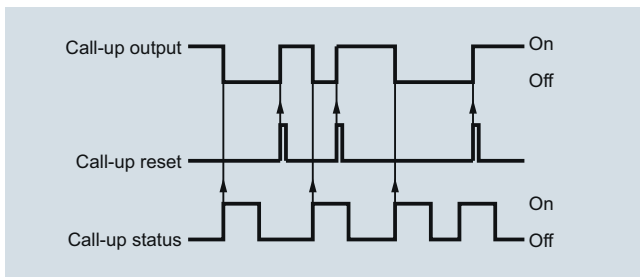
Output configuration



Pulse volume: output A/B configured as volume per pulse, calculated on forward/reverse or net forward/reverse flow. The volume per pulse is free scaleable (via PDM software).




Pulse output B can be used as stated above or as alarm or call-up function.




Call-up: the call-up output is active until manually reset by use of PDM tool. The call-up function is activated when an alarm is activated.

Sensor coaxial cable for SONOKIT series with FUS080

Coaxial cable		
Standard coaxial cable (75 Ω)		
Outside diameter	Ø 5.8 mm	
Length	15, 30 m (49.2, 98.4 ft) between sensor and transmitter	
Material (outside jacket)	Black PE	
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)	

Sensor coaxial cable for FUS380/FUE 380 series

Coaxial cable		
High temperature coaxial cable (75 Ω)		
With special designed glands for connection in the sensor/transducer		
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter – black holt melt junction part between (Ø 16 mm, length 70 mm)	
Length	Up to 30 m (98.4 ft) between sensor and transmitter	
Material (outside jacket)	Brown PTFE (0.3 m (9.84 ft) part) and black PE (for remaining cable)	
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)	

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080

Transmitter FUS080 operating instructions, accessories and spare parts

Operating instructions


Description	Article No.
for use with SONOKIT • English	A5E03059912
integrated in FUS/FUE380 • English • German • Spanish • French	A5E00730100 A5E00740611 A5E00754188 A5E00754173

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature. All literature is also available for free at: <http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Sun lid for FUS080 transmitter (frame and lid)	A5E02328485
Brace (holder) for optical IrDA eye	A5E00695277
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	FDK:087L4163

Process Device Manager SIMATIC PDM

SIMATIC PDM	See page 8/18, chapter "Communication and Software"
Details about the SIMATIC PDM tool can be found on page 8/11, chapter "Communication and Software"	

Spare parts

A spare part transmitter can be ordered for a specific system. In the description of the following spare part transmitters the related transmitter Article No. found on the device silver front label is noted.

Spare part transmitter for FUS380 systems (7ME3400)

Description	Article No.
FUS080 transmitter 3.6 V battery (no battery included, to be ordered separate) as spare part transmitter for FUS380 flowmeter series. Transmitter Article No. 7ME3450-0AA10-2AA0	A5E02729700
FUS080 transmitter 3.6 V battery (battery included) as spare part transmitter for FUS380 flowmeter series ¹⁾ . Transmitter Article No. 7ME3450-0AA20-2AA0	A5E02729035
FUS080 transmitter 230 V mains as spare part transmitter for FUS380 flowmeter series. Transmitter Article No. 7ME3450-0AA30-2AA0	A5E02699309
FUS080 transmitter 230 V mains with backup-battery as spare part transmitter for FUS380 flowmeter series. Transmitter Article No. 7ME3450-0AA40-2AA0	A5E02729610

When ordering: Inform on flowmeter Article No. and flowmeter serial no. (e.g. 7ME3400-xxxxx-xxxx-Z, XX.... and xxxxxxHxxx)

Spare part transmitter for FUE380 approved systems (7ME3410)

(only with MID approval marks, no MID verification – only a complete flowmeter can be MID-verified, i.e. sensor together with the transmitter)

Description	Article No.
FUE080 transmitter 3.6 V battery (no battery included, to be ordered separate) as spare part transmitter for FUE380 flowmeter series. Transmitter Article No. 7ME3450-0AA10-2AB0	A5E02734600
FUE080 transmitter 3.6 V battery (battery included) as spare part transmitter for FUE380 flowmeter series ¹⁾ . Transmitter Article No. 7ME3450-0AA20-2AB0	A5E02734568
FUE080 transmitter 230 V mains as spare part transmitter for FUE380 flowmeter series. Transmitter Article No. 7ME3450-0AA30-2AB0	A5E02734539
FUE080 transmitter 230 V mains with backup-battery as spare part transmitter for FUE380 flowmeter series. Transmitter Article No. 7ME3450-0AA40-2AB0	A5E02734585

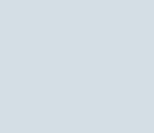
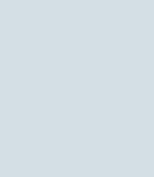
When ordering: Inform on flowmeter Article No. and flowmeter serial no. (e.g. 7ME3410-xxxxx-xxxx-Z, XX.... and xxxxxxHxxx)

Spare part transmitter for SONOKIT systems (7ME3210/7ME3220)



Description	Article No.
FUS080 transmitter 3.6V battery (no battery included, to be ordered separate) as spare part transmitter for SONOKIT flowmeters. Transmitter Article No. 7ME3450-0AA10-2AA0	A5E03048726
FUS080 transmitter 3.6V battery (battery included) as spare part transmitter for SONOKIT flowmeters ¹⁾ . Transmitter Article No. 7ME3450-0AA20-2AA0	A5E03048714
FUS080 transmitter 230V mains as spare part transmitter for SONOKIT flowmeters. Transmitter Article No. 7ME3450-0AA30-2AA0	A5E03048701
FUS080 transmitter 230V mains with backup-battery as spare part transmitter for SONOKIT flowmeters. Transmitter Article No. 7ME3450-0AA40-2AA0	A5E03048719



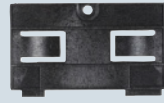




When ordering: Inform on flowmeter Article No. and flowmeter serial no. (e.g. 7ME3220-xxxxx-xxxx-Z, XX.... and xxxxxxHxxx)

¹⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.



Spare part transmitter for FUS880 retrofitting systems (7ME3440)

Description	Article No.	
<p>Sparepart FUS080 transmitter 3.6 V, incl. 3.6V dual batterie pack, USA version</p> <p>Transmitter Article No.: 7ME3450-0AA20-1CA0: Label, 0: Siemens FUS080 transmitter; Version, 0: Without connection box; Enclosure, A: IP67/NEMA 4X/6; Code A: Standard; Supply Voltage, 2: 3.6V DC battery; Ex. Approval, 0: no Ex approval; Display, 1: With display and unit label; Region version, C: USA: AcFt,CFS; Application, A: Standard FUS080 (for SITRANS Retrofit - 7ME344); Code, 0: Standard</p>	A5E03412669	
<p>FUS080 transmitter for FUS880 retrofit systems, USA version,</p> <p>incl. wall-mounting kit, 2 transducers and 2 pcs. 60ft (20 m) of cables.</p> <p>Label, 0: Siemens FUS080 transmitter; Diameter, 0A: None; Wall Thickness, A: None; Pipe Material, 0: No Pipe; Track configuration, 1: 1-Track; Region version, 2: USA: AcFt,CFS; Transmitter, D: FUS080,IP67, Battery, Remote, unit label; Template, A: None; Transducer coax cable, 4: 20 m with gland</p>	7ME3440-0AA01-2DA4	
<p>FUS080 transmitter for FUS880 retrofit systems, USA version,</p> <p>incl. wall-mounting kit, 4 transducers and 4 pcs. 60ft (20m) of cables:</p> <p>Label, 0: Siemens FUS080 transmitter; Diameter, 0A: None; Wall Thickness, A: None; Pipe Material, 0: No Pipe; Track configuration, 3: 2-Track (X-Configuration); Region version, 2: USA: AcFt,CFS; Transmitter, D: FUS080 ,IP67, Battery, Remote,unit label; Template, A: None; Transducer coax cable, 4: 20 m with gland</p>	7ME3440-0AA03-2DA4	

Description	Article No.	
<p>Internal battery pack, one set of 2 D-cell (3.6 V 33 Ah)¹⁾</p> <ul style="list-style-type: none"> 1 pc. pack 24 pcs. pack 	A5E02679676 A5E02896941	
<p>Single battery back-up to main supply (13.5 Ah)¹⁾</p>	A5E02679923	
<p>Battery cover for transmitter FUS080</p>	A5E00694468	
<p>PG 13.5 cable gland set for FUS080 power and output connection, black PA plastic, 2 pcs.</p> <ul style="list-style-type: none"> cables Ø 6 ... 12 mm (0.24" ... 0.47") -40 ... +100 °C (-40 ... +212 °F) 	FDK:083G0228	
<p>PG 13.5 cable gland set (two cable entries) for FUS080 sensor connection, black PA plastic, 2 pcs.</p> <ul style="list-style-type: none"> cables Ø 6 ... 12 mm (0.24" ... 0.47") -40 ... +100 °C (-40 ... +212 °F) 	A5E00694500	
<p>SITRANS FUS/FUE380 wall mounting kit for remote transmitter mounting, including connection plate (DN 50 ... DN 1200/2" ... 48")</p>	A5E00694509	
<p>SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (bronze sensors only, DN 50 ... DN 80/2" ... 3")</p>	A5E01208138	
<p>SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (steel sensors only, DN 100 ... DN 1200/4" ... 48")</p>	A5E00694660	
<p>FUS080 display and keypad</p>	A5E00873496	

¹⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.


Downloads for DEVICE description FUE380
<http://support.automation.siemens.com/WWW/view/en/23036121/133100>

Flow Measurement


SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080


Sensor cables for FUS380/FUE380 flowmeters

Description	Article No.	
DN 50 to 80 flowmeters		
Coaxial cable for FUS080; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part, max. 70 °C (158 °F); impedance 75 Ω		
5 m (16.4 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208092	
10 m (32.8 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208114	
20 m (65.6 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208117	
30 m (98.4 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208121	
0.5 m (1.64 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") for compact version of FUS380/FUE380	A5E01208126	
DN 100 to 1200 flowmeters		
Coaxial cable for FUS080; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part, max. 70 °C (158 °F); impedance 75 Ω		
5 m (16.4 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695476	
10 m (32.8 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695479	
20 m (65.6 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695480	
30 m (98.4 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695483	
Approx. 1 m (3.28 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") for compact version of FUS380/FUE380	A5E00695486	

Sensor cables for SONOKIT flowmeter with FUS080

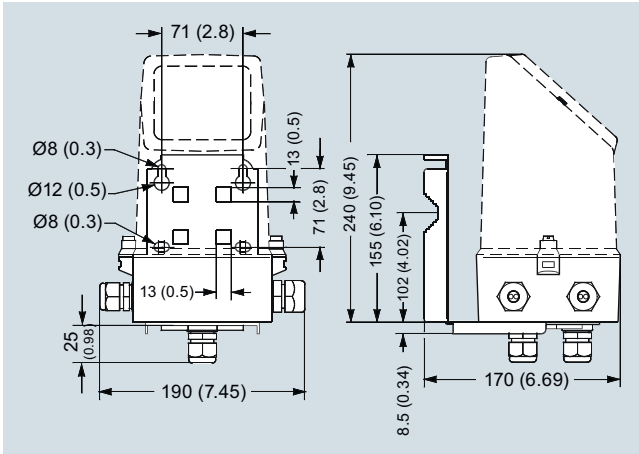
Description	Article No.	
15 m (49.2 ft) cable set (2 pcs.) remote mounting with SONOKIT flowmeters	A5E02478541	
30 m (98.4 ft) cable set (2 pcs.) remote mounting with SONOKIT flowmeters	A5E02478751	

Sensor cables for FUS880 retrofitting systems (7ME3440)

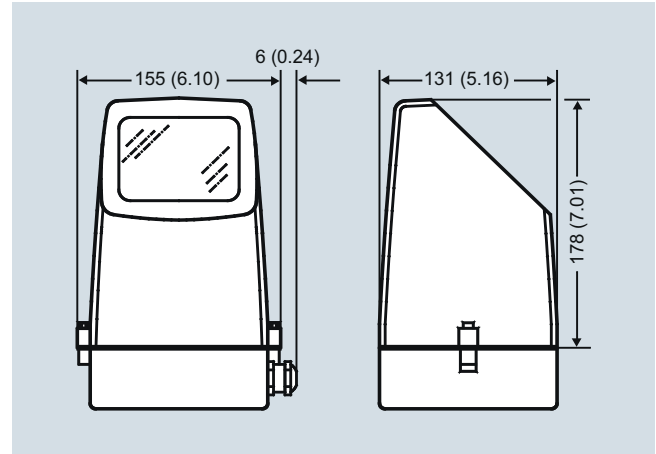
Description	Article No.	
Coaxial cable with transducer connection		
for use in FUS880 and SONO 3300 sensors; with 0.3 m brown PTFE high temperature transducer part, max. 200 °C (392 °F) and black PVC for the remaining transmitter part, max. 70 °C (158 °F); cable impedance 75 Ω		
• 1 x 10 m (32.8 ft)	FDK:085L2400	
• 1 x 20 m (65.6 ft)	FDK:085L2401	
• 1 x 30 m (98.4 ft)	FDK:085L2402	
Transducer spare part set of two transducers with gaskets for STRANS FUS880 retrofitting systems	FDK:087H3007	

Dimensional drawings

FUS080 transmitter IP67/NEMA 4X/6, wall mounting and compact mounting

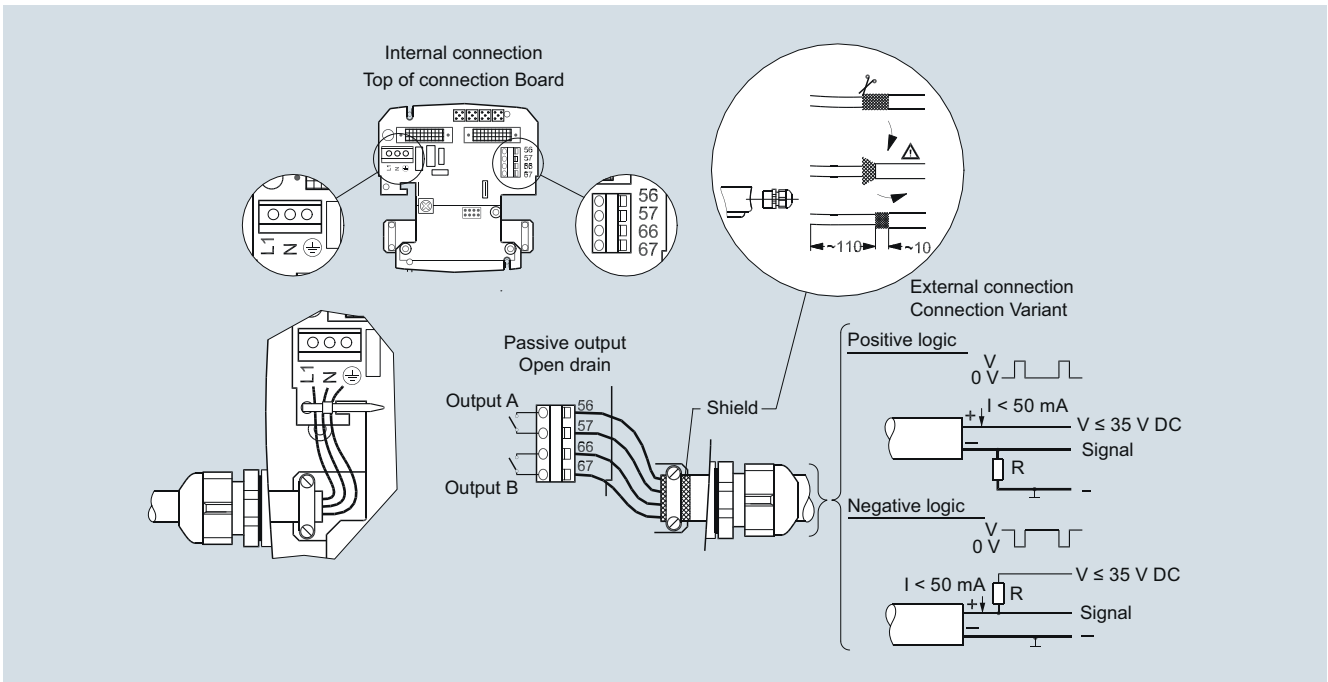


Transmitter wall mounted, dimensions in mm (inch)



Transmitter compact mounted, dimensions in mm (inch)

Schematics



Electrical connection of SITRANS FUS080

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Overview



The combination of SONO 3300 sensor and FUS060 transmitter is ideal for applications within the general industry. Measurements are independent of liquid temperature, density, pressure and conductivity. Transducers cannot be replaced.

Benefits

- Robust remote transmitter FUS060
- Robust design for industrial applications
- Measures all liquids less than 350 cSt, conductive or non-conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long-time stability
- ATEX approval

Application

The main application for SONO 3300/FUS060 ultrasonic flowmeter is measurement of volume.

SONO 3300/FUS060 can be used for water and treated waste water, oil, hot water/cooling systems.

Design

The SONO 3300/FUS060 consists of a casted sensor (DN 50 to 80 (2" to 3")), welded pipes (DN 100 to 300 (4" to 12")) and a transmitter FUS060.

The transmitter can only be mounted separately.

The internal signal cables from transducers to sensor connection box are protected from an aggressive environment by stainless steel pipes.

Sensor installation

See system information.

Technical specifications

The transmitter related to this system is the SITRANS FUS060.
Technical specifications to the FUS060 see page 3/245.

2-path sensor with flanges and inline transducers

Error in measurement

Error in measurement at reference conditions	$v > 0.5 \dots 10 \text{ m/s}$, $< \pm 0.5 \%$ of rate (v =flow speed)
Max. flow velocity	10 m/s (32 ft/s)

Nominal size

Media temperature	Separate version: $-10 \dots +160 \text{ }^\circ\text{C}$ ($14 \dots 320 \text{ }^\circ\text{F}$)
Ambient temperature (sensor)	Separate version: $-20 \dots +60 \text{ }^\circ\text{C}$ ($-4 \dots +140 \text{ }^\circ\text{F}$) Storage: $-40 \dots +85 \text{ }^\circ\text{C}$ ($-40 \dots +185 \text{ }^\circ\text{F}$)
Enclosure	Standard version: IP67 (NEMA 4X/NEMA 6) ATEX version: As standard, but with ATEX approval (see below)

Process connections

PN designated EN 1092-1, type 11	<ul style="list-style-type: none"> • DN 50 ... 300 (2" ... 12"), PN 40 • DN 100 ... 300 (4" ... 12"), PN 16 • DN 200 ... 300 (8" ... 12"), PN 10
Class designated EN 1759-1	<ul style="list-style-type: none"> • DN 50 ... 300 (2" ... 12"), class 150 • DN 50 ... 300 (2" ... 12"), class 300
Transducer	Inline version welded into pipe

Materials

Pipe	<ul style="list-style-type: none"> • DN 50 ... 80 (2" ... 3"): Cast steel EN 1.1131-GS-15Mn5 • DN 100 ... 300 (4" ... 12"): Carbon steel EN 1.0345-P235GH
Flange	<ul style="list-style-type: none"> • DN 50 ... 300 (2" ... 12"): EN 1.0025-S235JRG2
Class	ASTM A105
Transducer	Stainless steel AISI 316 or similar

Certificates and approvals

Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according to EN 10204-3.1 is optionally available
NDT examination report	Extended material certificate is available on request
Calibration report	A standard calibration report is shipped with each flowmeter.
Extended accredited ISO/IEC 17025 calibration certificates	Optionally available
Approvals	No custody transfer approvals
Ex approval	System ATEX approval for SONO 3300 with remote transmitter FUS060-Ex (ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3) For Ex version the transducer cable length is restricted to 3 m (9.84 ft), in order to meet requirements.

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

Coaxial cable between sensor SONO 3300 and transmitter FUS060

Standard Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.8 mm
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter
Material (outside jacket)	black PE
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)
High temperature Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max. 3 m (9.84 ft)) transducer cable length for Ex area mounted transmitters)
Material (outside jacket)	Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)



Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Selection and Ordering data

Sensor SONO 3300 with transmitter FUS060

Article No. Order code

7ME3300-

0 -

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter Qn setting [m³/h]

DN 50 (2")	10
DN 50 (2")	26
DN 50 (2")	60
DN 65 (2½")	15
DN 65 (2½")	42
DN 65 (2½")	100
DN 80 (3")	20
DN 80 (3")	60
DN 80 (3")	150
DN 100 (4")	36
DN 100 (4")	100
DN 100 (4")	230
DN 125 (5")	50
DN 125 (5")	150
DN 125 (5")	360
DN 150 (6")	80
DN 150 (6")	220
DN 150 (6")	500
DN 200 (8")	120
DN 200 (8")	380
DN 200 (8")	900
DN 250 (10")	200
DN 250 (10")	600
DN 250 (10")	1400
DN 300 (12")	300
DN 300 (12")	850
DN 300 (12")	2200

1 A
1 B
1 D
1 E
1 F
1 H
1 J
1 K
1 M
1 N
1 P
1 R
1 S
1 T
1 V
2 A
2 B
2 D
2 E
2 F
2 H
2 J
2 K
2 M
2 N
2 P
2 R

Flange norm and pressure rating

(All sizes are not available in all pressure ratings)

EN 1092-1

PN 10 (DN 200 ... 300 (8" ... 12"))
PN 16 (DN 80 ... 300 (3" ... 12"))
PN 40 (DN 50 ... 300 (2" ... 12"))

B
C
E

ANSI B16.5

class 150 (DN 50 ... 300 (2" ... 12"))
class 300 (DN 50 ... 300 (2" ... 12"))

H
J

Sensor type (approval) and transmitter mounting

IP67 standard, remote transmitter
IP67 Ex-version (ATEX), remote transmitter (Ex-version)

1
3

Cable gland entries in FUS060 and SONO 3300

Cable glands M20 in sensor and in transmitter M25/20/16 x 1.5

1

Transmitter version of SITRANS FUS060

IP65 (NEMA 4), 120/230 V AC
IP65 (NEMA 4), 24 V AC/DC
IP65 (NEMA 4), 24 V AC/DC, Ex-version (ATEX)

N
P
Q

Selection and Ordering data

Sensor SONO 3300 with transmitter FUS060

Article No. Order code

7ME3300-

0 -

FUS060 output module

HART, 4 ... 20 mA, 1 pulse output, 1 relay
HART, Ex version, 4 ... 20 mA, 1 pulse output, 1 relay
PROFIBUS PA, 1 pulse/frequency

B
C
D

Transducer coaxial cable

4 x 3 m, max. 70 °C (158 °F), the only option for Ex i
4 x 15 m, max. 70 °C (158 °F)
4 x 30 m, high temp. max.200 °C (392 °F)
4 x 30 m, max. 70 °C (158 °F)
4 x 60 m, max. 70 °C (158 °F)
4 x 90 m, max. 70 °C (158 °F)
4 x 120 m, max. 70 °C (158 °F)
4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i
4 x 15 m, high temp. max. 200 °C (392 °F)

0
1
2
3
4
5
6
7
8

Selection and Ordering data

Order code

Additional information

Please add „-Z“ to Article No. and specify Order code(s) and plain text.

Calibration

Production calibration DN 50 ... DN 300 (with certificate, 2 x 3 points in 10 %, 25 % and 100 % Qn)

Included

Accredited Siemens ISO/IEC 17025 calibration for DN 50 to DN 200 with Qn as selected in Diameter. Calibration certificate: 2 x 5 points in 5%, 10 %, 25 %, 50% and 100 % Qn (max. flow 630 m³/h).

D20

Accredited Siemens ISO/IEC 17025 calibration for DN 200 to DN 300 with Qn as selected in Diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 2000 m³/h).

D21

Material certificate

EN 10204-3.1

F10

Tag name plate

Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).

Y17



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Flowmeter SONO 3300 with FUS060 operating instructions, accessories and spare parts**Operating instructions**


Description	Article No.
SITRANS FUS060	
• English	A5E01204521
• German	A5E02123845
SITRANS F US SONO 3300	
• English	A5E01365400
• German	A5E02690975
• Spanish	A5E02690992
• French	A5E02690987

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>


Accessories**Potting kit**

Description	Article No.
Potting kit for terminal box of SONO 3200 transducers for IP68/NEMA 6P (not for Ex sensors)	FDK:085L2403


Cable connection boxes


(Optional for the connection of individually transducer cables with the FUS060 transducer cables)

Description	Article No.
Junction box for coaxial cable	
• IP68 metal box for 4 coaxial cables	FDK:085B1361


Spare parts


Cables for SONO 3300 with FUS060 (only as spare parts)

Description	Length m (ft)	Article No.
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101
	15 (49.21)	A5E00861432
	30 (98.43)	A5E01278662
	60 (196.85)	A5E01278682
	90 (295.28)	A5E01278687
	120 (393.70)	A5E01278698
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part (max. 200 °C (392 °F)) and black PVC transmitter part with SMB plug (max. 70 °C (158 °F)); impedance 75 Ω (2 pcs.)	3 (9.84)	A5E00875105
	15 (49.21)	A5E00861435
	30 (98.43)	A5E01196952



Cable glands (for the SONO 3300 terminal box) (only as spare parts)



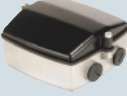
Type	Material	Temperature range [°C (°F)]	Article No.
M20	Nickel-plated brass, 2x cables Ø 5 ... 6 mm (2 pcs.)	-25 ... +200 (-13 ... +392)	A5E02246329



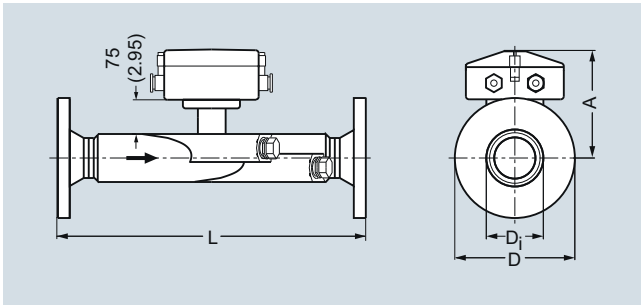
Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Description	Article No.	
SONO 3300 terminal box lid, in stainless steel painted black (1 pc.)	FDK-085U1505	
Gasket for SONO 3300 terminal lid in EPDM (1 pc.)	FDK-085U1820	
SONO 3300 stainless steel terminal box (1 pc.), M20 cable gland version, incl. lid in stainless steel (painted black) and gasket in EPDM	A5E00836867	

Dimensional drawings



Sensor SONO 3300, dimensions in mm (inch)

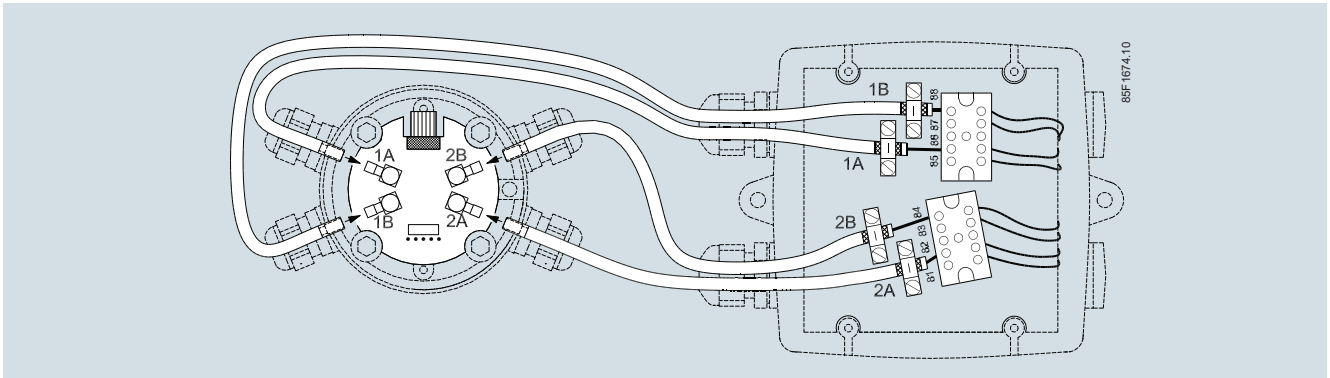
DN	EN 1092-1																	
	PN 10						PN 16						PN 40					
	L ¹⁾		D		Di		L ¹⁾		D		Di		L ¹⁾		D		Di	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
50													475	18.70	165	6.50	52.60	2.07
65													475	18.70	185	7.28	62.70	2.47
80							380	14.96	200	7.87	78.00	3.07	400	15.75	200	7.87	78.00	3.07
100							375	14.76	220	8.66	102.40	4.00	400	15.75	235	9.25	102.40	4.00
125							375	14.76	250	9.84	128.30	5.05	400	15.75	270	10.63	128.30	5.05
150							360	14.17	285	11.22	154.20	6.07	400	15.75	300	11.81	154.20	6.07
200	400	15.75	340	13.39	207.30	8.16	400	15.75	340	13.39	207.30	8.16	450	17.72	375	14.76	206.50	8.13
250	400	15.75	395	15.55	260.40	10.25	400	15.75	405	15.94	260.40	10.25	500	19.69	450	17.72	258.80	10.19
300	400	15.75	445	17.52	309.70	12.19	420	16.54	460	18.11	309.70	12.19	500	19.69	515	20.28	307.90	12.12

DN	ANSI												Weight ²⁾					
	150 lb						300 lb						EN and ANSI		EN		ANSI	
	L ¹⁾		D		Di		L ¹⁾		D		Di		A		EN	ANSI		
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lb	kg	lb
50 mm/2"	510	20.08	152	5.98	52.6	2.07	520	20.47	165	6.50	52.6	2.07	180	7.09	14	30.9	17	37.5
65 mm/2½"	510	20.08	178	7.01	62.7	2.47	520	20.47	190	7.48	62.7	2.47	186	7.32	16	35.3	20	44
80 mm/3"	420	16.54	191	7.52	78.0	3.07	440	17.32	210	8.27	78.0	3.07	193	7.60	19	42	23	51
100 mm/4"	420	16.54	229	9.01	102.4	4.03	440	17.32	254	10	102.4	4.03	205	8.07	25	55	35	78
125 mm/5"	440	17.32	254	10.00	128.3	5.05	460	18.11	279	10.98	128.3	5.05	218	8.58	29	64	40	89
150 mm/6"	430	16.93	279	10.98	154.2	6.07	450	17.71	318	12.52	154.2	6.07	232	9.13	35	78	50	111
200 mm/8"	480	18.90	343	13.50	202.7	7.98	500	19.69	381	15	202.7	7.98	256	10.08	54	119	72	160
250 mm/10"	490	19.29	406	15.98	254.5	10.02	520	20.47	444	17.48	254.5	10.03	283	11.14	85	189	98	217
300 mm/12"	550	21.65	483	19.02	306.3	12.06	580	22.83	521	20.51	306.3	12.06	309	12.17	115	256	142	322

¹⁾ Length tolerance (mm): DN 50 ... 100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 300 +4/-5

²⁾ Approximate weights without transmitter FUS060 - weight of FUS060 is 4.4 kg (9.7 lb)

Schematics



Electrical connection of SITRANS FUS060 and SONO 3300

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Overview



The combination of the SONO 3100 sensor and the FUS060 transmitter is ideal for applications where process shut-down is impossible during service and where there is a need for extreme high/low temperatures and pressures.

Transducers can be changed without interrupting operation. SONO 3100 can optionally be delivered as a 4-path solution for absolute best performance and accuracy.

Benefits

- Transducers can be replaced under pressure
- Measurement of all liquids less than 350 Cst, conductive or non-conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long-time stability
- On request as special versions:
 - Special sensor material, e.g. Duplex, stainless steel
 - High/low temperature sensor version: +250 °C (+482 °F)/ -200 °C (-328 °F) sensors
 - Pressure rating 430 bar (6235 psi)
 - Special sensor sizes down to DN 25
 - 1-path or 4-path sensor technology

Application

The main application for SONO 3100 in combination with transmitter type FUS060 is to measure volume flow within:

- Petrochemical industry
- Power engineering
- Water and waste water
- Oil and liquefied gases

SITRANS FUS060 holds ATEX for hazardous areas, HART and PROFIBUS PA. SONO 3100 holds ATEX Ex approval.

Design

The SONO 3100 in combination with FUS060 consists of a SONO 3100 sensor, SONO 3200 transducers with O-rings or flanges depending on selection - and a FUS060 transmitter. SONO 3100 is basically supplied in a 2-path solution with flanges in sizes from DN 100 to DN 600 and without flanges in sizes from DN 100 to DN 300.

1-path or 4-path special versions are available on request, depending on size (DN 25 to DN 4000).

SONO 3100 is as standard available in carbon steel from DN 100 to DN 600.

FUS060 is designed for remote wall mounting only.

Technical specifications

The transmitter related to this system is the SITRANS FUS060. Technical specifications to the FUS060 see page 3/245.

2-path sensor fitted with four SONO 3200 transducers

Error in measurement

Error in measurement at reference conditions $v > 0.5 \dots 10 \text{ m/s}$, $< \pm 0.5 \%$ of rate ($v = \text{flow velocity}$)

Max flow velocity 10 m/s (32 ft/s)

Nominal size DN 100 ... 600 (4" ... 24")

Media temperature

- Standard -10 ... +200 °C (14 ... 392 °F)

- ATEX Ex d version -20 ... +200 °C (-4 ... +392 °F)

- ATEX Ex i version -10 ... +200 °C (14 ... +392 °F)

- Specials -200 °C (-328 °F) or up to 250 °C (482 °F)

Ambient temperature

- Standard and Ex-i version -20 ... +60 °C (-4 ... +140 °F)

- Ex d version -20 ... +180 °C (-4 ... +356 °F)

Enclosure

IP67 (NEMA 4X/6)/IP68 (NEMA 6P) and ATEX (see below)

Process connections

PN designated, EN 1092-1, type 11

Pipe material carbon steel

- DN 200 ... 600 (8" ... 24"), PN 10
- DN 100 ... 600 (4" ... 24"), PN 16
- DN 200 ... 600 (8" ... 24"), PN 25
- DN 100 ... 500 (4" ... 20"), PN 40

Class designated, EN 1759-1

Pipe material carbon steel

- DN 100 ... 600 (4" ... 24") Class 150
- DN 100 ... 300 (4" ... 12") Class 300

Without flanges (EN 10217), (weld-in version)

only in carbon steel

- DN 350 ... 600 (14" ... 24"), PN 10
- DN 100 ... 600 (4" ... 24"), PN 16
- DN 200 ... 600 (8" ... 24"), PN 25
- DN 100 ... 500 (4" ... 20"), PN 40

Transducer SONO 3200

O-ring or flange versions

Materials

Pipe

Steel EN 1.0345-P235GH

Flange

PN

EN 10025-S235JRG2, 1E1

Class

ASTM A105, 1, 1

Transducer body

Stainless steel AISI 316 or similar

Transducer terminal house

Stainless steel AISI 316 or plastic PA 6.6

Certificates and approvals

System ATEX approval for SONO 3100 together with transmitter FUS060-Ex

ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 or
ATEX II 2G Ex d IIC T3-T6 Gb with SONO 3200 Exd transducers (for standard FUS060 transmitter, installed outside of Ex zone)

For FUS060 Ex version the transducer cable length is restricted to 3 m (9.84 ft), in order to meet requirements for electrical immunity.

Conformity certificate

The devices are supplied as standard with a Siemens Certificate of Conformity on CD

Material certificate

Material certificate according to EN 10204-3.1 is optionally available

NDT examination report

Extended material certificate is optionally available

Pressure certificate

Pressure test according EN 1024-2.3 optionally available

Calibration report

A standard calibration report is shipped with each flowmeter.

Optionally available:

Extended accredited ISO/IEC 17025 calibration certificates

Approvals

No custody transfer approvals

The sensor SONO 3100 with transmitter FUS060 conforms to Product Family Standard EN 61326/A3 appendix A (Title: Electrical Equipment for Measurement control and laboratory use – EMC requirements).

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

The SONO 3100 as weld-in version does not include the flanges. Thus, it can neither be tested nor approved according to PED. After the installation, all installation-related activities (welding, pressure test etc.) are the responsibility of the customer.

Selection and Ordering data

Article No. Order code

SITRANS F US SONO 3100 sensor 2-path

7ME3100-

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter Qn setting [m³/h]

DN 100 (4")	28	1 N
DN 100 (4")	100	1 P
DN 100 (4")	220	1 R
DN 125 (5")	44	1 S
DN 125 (5")	150	1 T
DN 125 (5")	350	1 V
DN 150 (6")	64	2 A
DN 150 (6")	220	2 B
DN 150 (6")	500	2 D
DN 200 (8")	110	2 E
DN 200 (8")	380	2 F
DN 200 (8")	900	2 H
DN 250 (10")	180	2 J
DN 250 (10")	600	2 K
DN 250 (10")	1300	2 M
DN 300 (12")	250	2 N
DN 300 (12")	850	2 P
DN 300 (12")	2000	2 R
DN 350 (14")	350	2 S
DN 350 (14")	1000	2 T
DN 350 (14")	2800 ¹⁾	2 V
DN 400 (16")	450	3 A
DN 400 (16")	1300	3 B
DN 400 (16")	3600	3 D
DN 500 (20")	1300	3 J
DN 500 (20")	2200	3 K
DN 500 (20")	4200 ¹⁾	3 M
DN 600 (24")	1300	3 S
DN 600 (24")	3200	3 T
DN 600 (24")	4200 ¹⁾	3 V

Flange norm and pressure rating

(All sizes are not available in all pressure ratings)

EN 1092-1

PN 10 (DN 200 ... DN 600)

PN 16 (DN 100 ... DN 600)

PN 25 (DN 200 ... DN 600)

PN 40 (DN 100 ... DN 500)

ANSI B16.5

class 150 (DN 100 ... DN 600)

class 300 (DN 100 ... DN 300)

Pipe without flanges (EN 10217) (weld-in version)²⁾

PN 10 (DN 200 ... DN 600)

PN 16 (DN 100 ... DN 600)

PN 25 (DN 200 ... DN 600)

PN 40 (DN 100 ... DN 500)

B

C

D

E

H

J

P

Q

R

S

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Selection and Ordering data

SITRANS F US SONO 3100 sensor 2-path Article No. Order code
7ME3100 -

Pipe and flange material

Carbon steel (DN 100 ... 1200) 1

Transducer type and approval

IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 50 mm, 100 °C (212 °F) (DN 100 ... 600) 1
 IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C (392 °F) (DN 100 ... 600) 2
 IP68 SS housing, PN 40, O-ring, 50 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 600) 3
 IP67 (NEMA 4X/6) PA housing, PN 40, flange, 88 mm, 100 °C (212 °F) (DN 100 ... 300) 4
 IP68 SS housing, PN 40, flange, 88 mm, 200 °C (392 °F) (DN 100 ... 300) 5
 IP68 SS housing, PN 40, flange, 88 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 300) 6
 IP67 SS housing, PN 40, O-ring, 50 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version) (DN 100 ... 600) 7
 IP67 SS housing, PN 40, flange, 88 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version) (DN 100 ... 300) 8

Cable gland entries

Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 1
 Cable glands ½" NPT in transducers and in transmitter 2

Transmitter version of SITRANS FUS060

IP65 (NEMA 4), 120/230 V AC N
 IP65 (NEMA 4), 24 V AC/DC P
 IP65 (NEMA 4), 24 V AC/DC ATEX Ex version Q

FUS060 output module

HART, 1 pulse output, 1 relay B
 HART Ex, 1 pulse output, 1 relay C
 PROFIBUS PA, 1 pulse/frequency D

Transducer coaxial cable

4 x 3 m, max. 70 °C (158 °F), the only option for Ex i 0
 4 x 15 m, max. 70 °C (158 °F) 1
 4 x 30 m, high temp. max. 200 °C (392 °F) 2
 4 x 30 m, max. 70 °C (158 °F) 3
 4 x 60 m, max. 70 °C (158 °F) 4
 4 x 90 m, max. 70 °C (158 °F) 5
 4 x 120 m, max. 70 °C (158 °F) 6
 4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i 7
 4 x 15 m, high temp. max. 200 °C (392 °F) 8

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.

- 1) Reduced Q value during calibration (Qn setting unchanged).
 2) For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed by ordering (only if the factor of Du / Wxx > 100).

Selection and Ordering data

Order code

Additional information

Please add „-Z“ to Article No. and specify Order code(s) and plain text.

Calibration

Production calibration DN 100 ... DN 600 (with certificate)

Included

Accredited Siemens ISO/IEC 17025 calibration for DN 100 to DN 200 with Qn as selected in diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 630 m³/h).

D20

Accredited Siemens ISO/IEC 17025 calibration for DN 200 to DN 600 with Qn as selected in diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 2800 m³/h).

D21

Accredited Siemens ISO/IEC 17025 calibration for DN 400 to DN 600 with Qn as selected in diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 8000 m³/h).

D22

Material certificate

EN 10204-3.1 F10
 EN 10204-3.1 and 100 % NDT on weldings, DN 100 ... DN 400 F11
 EN 10204-3.1 and 100 % NDT on weldings, DN 500 ... DN 600 F12

Pressure certificate

EN 10204-2.3 F21

Tag name plate

Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text). Y17



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Flowmeter SONO 3100 with FUS060 operating instructions, accessories and spare parts

Operating instructions


Description	Article No.
SITRANS FUS060	
• English	A5E01204521
• German	A5E02123845
SITRANS F US SONO 3100	
• English	A5E00814513

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.


All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Potting kit for terminal box of SONO 3200 transducer for IP68/NEMA 6P (not for Ex sensors)	FDK:085L2403




Description	Transducer length	Article No.
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure and for hot-tapping (working conditions: typically water, max. 40 bar and max. 60 °C (max. 580 psi and max. 140 °F))	50 mm (1.97") transducers	FDK:085B5331



Cable connection boxes

(For the connection of individually transducer cables with the FUS060 transducer cables)

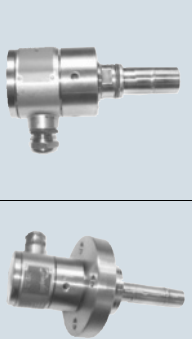
Description	Article No.
Junction box for coaxial cable	
• IP68 metal box for 4 coaxial cables	FDK:085B1361
• IP68 EEx e plastic box for 4 coaxial cables, no ATEX approval	FDK:085B1363



Spare parts

Transducer SONO 3200 spare parts, complete units

Type	Material	Gasket	Press. rating	Terminal housing	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Article No.
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	50 (1.97)	FDK:085B5453
O-ring	316 SS	O-ring	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	50 (1.97)	FDK:085B5450
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex d ¹⁾	-20 ... +200 (-4 ... +392)	50 (1.97)	FDK:085B5451
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex i ²⁾	-10 ... +200 (14 ... 392)	50 (1.97)	A5E00836448
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	50 (1.97)	A5E00839472
O-ring	316 SS	O-ring	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	50 (1.97)	A5E00839431
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	88 (3.47)	FDK:085B5461
Flange	316 SS	Graphite	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B5462
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex d ¹⁾	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B5463
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex i ²⁾	-10 ... +200 (14 ... +392)	88 (3.47)	A5E00836465
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	88 (3.47)	A5E00839479
Flange	316 SS	Graphite	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	88 (3.47)	A5E00839440
Flange	316 SS	Copper ring	PN 40	316 SS PG13.5 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	FDK:085B5416
Flat flange	316 SS	Flat gasket	PN 40	316 SS M20 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	A5E02593524
Flange	316 SS	Graphite	PN 160	316 SS M20		-20 ... +180 (-4 ... +356)	88 (3.47)	FDK:085B5464
Flange	316 SS	Graphite	PN 160	316 SS M20	Ex d ¹⁾	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B5465



¹⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb


²⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060


Terminal housing for SONO 3200 sensor

Type	Pressure rating	Material	Temp. range [°C (°F)]	Article No.	
Terminal housing (M20 cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	FDK:085B5501	
Terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	FDK:085B5504	
Terminal housing (1/2" NPT cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	A5E00839460	
Terminal housing (1/2" NPT cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	A5E00839427	
Ex d ¹⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	FDK:085B5505	
Ex i ²⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-10 ... +200 (14 ... 392)	A5E00835255	

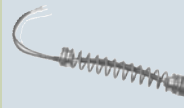
1) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

2) For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3






SONO 3200 spare parts, transducer body without terminal housing, including insert

Type	Material	Gasket	Pressure rating	Temp. range [°C (°F)]	Length mm (inch)	Article No.	
O-ring	316 SS	O-ring	PN 40	-20 ... +200 (-4 ... +392)	50 (1.97)	FDK:085B1405	
Flange	316 SS	Graphite	PN 40	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B1464	

SONO 3200 spare parts, transducer insert

Type	Temp. range [°C (°F)]	Length mm (inch)	Article No.	
Insert	-20 ... +200 (-4 ... +392)	50 (1.97)	FDK:085B1411	
Insert	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B1459	


Transducer SONO 3200 gaskets

Type	Pressure rating	Material	Temperature range [°C (°F)]	Article No.	
Gasket O-ring (3 pcs. for o-ring transducers)	PN 40	FKM	-20 ... +200 (-4 ... +392)	FDK:085B1089	
Gasket flange	PN 40/160	Graphite	-20 ... +200 (-4 ... +392)	FDK:085B1080	
Gasket and 12 mm (0.47") bolts and nuts for flange transducers	PN 40	Flat ring type	-20 ... +200 (-4 ... +392)	FDK:085B1083	
Gasket and 16 mm (0.63") bolts and nuts for flange transducers	PN 160	Graphite, 316 SS	-20 ... +200 (-4 ... +392)	FDK:085B1084	
Gasket for cryogenics transducer with flat flange (2 pcs.)	PN 40	Graphite/metal	-200 ... +100 (-328 ... +212)	A5E02593522	

SONO 3200 cable glands

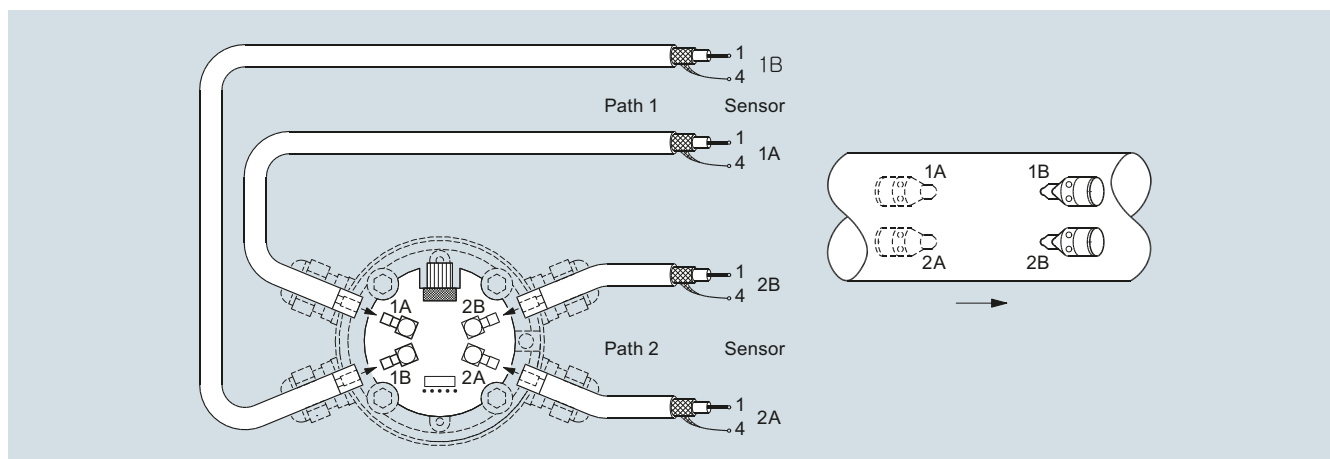
Type/description	Temperature range [°C (°F)]	Appr.	Article No.	
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		A5E02246304	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		A5E02246309	
½" NPT chrome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		A5E02246258	
M20 stainless steel, cable Ø 4 ... 6 mm	-25 ... 200 (-13 ... +392)	Ex i	A5E02246194	
M20 Stainless steel, cable Ø 5 ... 8 mm	-60 ... 180 (-76 ... +356)	Ex d	A5E02246311	

Cables for SONO 3100 with FUS060

Description	Length m (ft)	Article No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101	
	15 (49.21)	A5E00861432	
	30 (98.43)	A5E01278662	
	60 (196.85)	A5E01278682	
	90 (295.28)	A5E01278687	
	120 (393.7)	A5E01278698	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	A5E00875105	
	15 (49.21)	A5E00861435	
	30 (98.43)	A5E01196952	
SITRANS F US special coaxial cable sets for low temperature cryogenic systems, with SMB-plug for transmitter SITRANS FUS060, PTFE material, temp. -200 ... +200 °C (-328 ... +392 °F), impedance 75 Ω (2 pcs.)	10 (32.84)	A5E02085593	
	15 (49.21)	A5E03262088	
	30 (98.43)	A5E02085644	
	40 (131.23)	A5E02085649	

3

Schematics



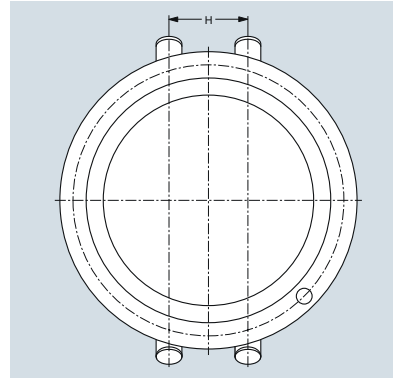
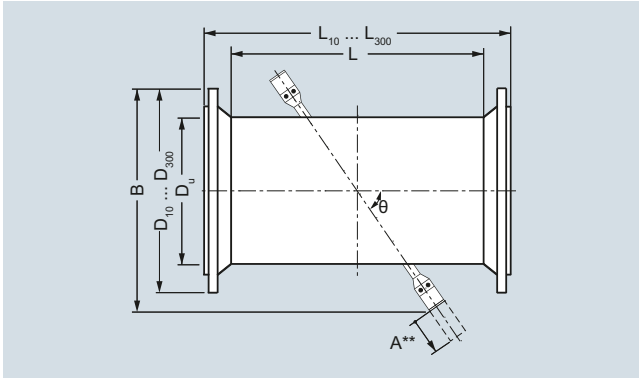
Electrical connection of SITRANS FUS060 and SONO 3100

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Dimensional drawings of sensor SONO 3100



Sensor SONO 3100 with EN norm

DN	DU	L ^{1) 4)} [mm]	B ⁵⁾ [mm]	θ	H	PN 10			PN 16			PN 25			PN 40		
						W ₁₀ ²⁾ [mm]	D ₁₀ [mm]	L ₁₀ ¹⁾ [mm]	W ₁₆ ²⁾ [mm]	D ₁₆ [mm]	L ₁₆ ¹⁾ [mm]	W ₂₅ ²⁾ [mm]	D ₂₅ [mm]	L ₂₅ ¹⁾ [mm]	W ₄₀ ²⁾ [mm]	D ₄₀ [mm]	L ₄₀ ¹⁾ [mm]
100	114.3	860	305	45 ³⁾	42.8	-	-	-	3.6	220	960	-	-	-	3.6	235	990
125	139.7	862	325	45 ³⁾	64.5	-	-	-	4.0	250	970	-	-	-	4.0	270	990
150	168.3	862	350	45 ³⁾	78.1	-	-	-	4.5	285	970	-	-	-	4.5	300	1010
200	219.1	668	430	45 ³⁾	102.1	6.3	340	790	6.3	340	790	6.3	360	820	6.3	375	840
250	273.0	714	480	45 ³⁾	127.6	6.3	395	850	6.3	405	850	7.1	425	890	7.1	450	920
300	323.9	607	525	45 ³⁾	151.8	7.1	445	740	7.1	460	760	8.0	485	790	8.0	515	830
350	355.6	639	550	45 ³⁾	166.4	8.0	505	770	8.0	520	800	8.0	555	840	8.8	580	880
400	406.4	703	600	45 ³⁾	191.3	8.0	565	850	8.0	580	875	8.8	620	925	11.1	660	975
500	508.0	797	690	45 ³⁾	241.1	7.1	670	950	8.0	715	980	10.0	730	1050	14.2	755	1080
600	610.0	912	705	60	294.8	7.1	780	1075	8.8	840	1105	11.0	845	1165	-	-	-

¹⁾ Length tolerance (mm): DN 100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 400 +4/-5, DN 500 ... 600 +5/-6

²⁾ Wall thickness for pressure rates PN 6 ... 40. For weld-in sensor versions according EN10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y=P, Q, R, S) the tube roundness shall be agreed by ordering (only if the factor of Du/Wxx > 100).

³⁾ For all sensors with flange transducers path angle are 60°

⁴⁾ L is the length of sensor versions without flanges (weld-in version)

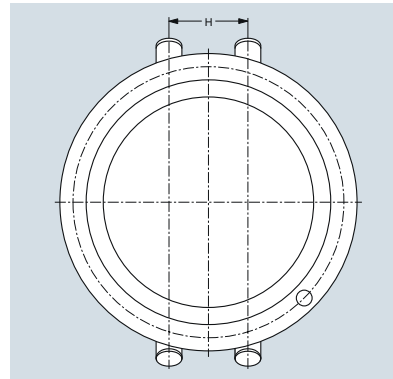
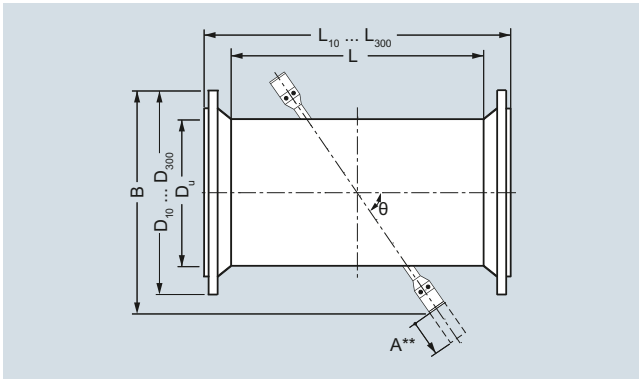
⁵⁾ B dimension value is an approximate information and may differ a little by flange pressure rate.

A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information on page 3/267.

SONO 3100, 2-path

Nominal diam. DN	Flange type - Weight [kg (lb)]			
	PN 10	PN 16	PN 25	PN 40
100 (4")	-	32 (70.5)	-	35 (77.2)
125 (5")	-	38 (83.8)	-	44 (97.0)
150 (6")	-	45 (99.2)	-	52 (114.6)
200 (8")	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250 (10")	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300 (12")	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350 (14")	98 (216.0)	113 (249.1)	145 (322.9)	191 (421.1)
400 (16")	119 (262.4)	141 (310.9)	191 (421.1)	275 (606.3)
500 (20")	153 (337.3)	207 (456.4)	284 (626.0)	379 (836.0)
600 (24")	193 (425.5)	276 (608.5)	363 (800.3)	-

Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lb). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lb).



Sensor SONO 3100 with ANSI norm

Size (DN)	D _U	L ^{1) 4)}	B ⁵⁾	θ	H	Class 150			Class 300		
						W ₁₅₀ ²⁾	D ₁₅₀	L ₁₅₀ ¹⁾	W ₃₀₀ ²⁾	D ₃₀₀	L ₃₀₀ ¹⁾
inch (mm)	[inch]	[inch]	[inch]	[°]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
4 (100)	4.50	33.86	12.01	45 ³⁾	1.69	0.14	9.00	39.86	0.25	10.00	40.62
5 (125)	5.50	33.94	12.80	45 ³⁾	2.54	0.15	10.00	40.94	0.27	11.00	41.70
6 (150)	6.63	33.94	13.78	45 ³⁾	3.07	0.16	11.00	40.94	0.30	12.50	41.70
8 (200)	8.63	26.30	16.93	45 ³⁾	4.02	0.16	13.50	34.30	0.29	15.00	35.06
10 (250)	10.75	28.11	18.90	45 ³⁾	5.02	0.18	16.00	36.11	0.34	17.50	37.35
12 (300)	12.75	23.90	20.67	45 ³⁾	5.98	0.20	19.00	32.90	0.39	20.50	34.14
14 (350)	14.00	25.16	21.65	45 ³⁾	6.55	0.21	21.00	35.16	-	-	-
16 (400)	16.00	27.68	23.62	45 ³⁾	7.53	0.22	23.50	33.74	-	-	-
20 (500)	20.00	31.38	27.17	45 ³⁾	9.49	0.26	27.50	42.76	-	-	-
24 (600)	24.00	35.91	27.76	60	11.61	0.30	32.00	47.91	-	-	-

¹⁾ Length tolerance (mm): 4" +0.08"/-0.12" (+2/-3mm), 5" ... 8" +0.12"/-0.16" (+3/-4mm), 10" to 16" +0.16"/-0.20" (+4/-5mm), 20" ... 24" +0.20"/-0.24" (+5/-6mm)

²⁾ Minimum wall thickness for pressure rates Class 150 or Class 300. For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed by ordering (only if the factor of Du/Wxx > 100).

³⁾ For all sensors with flange transducers path angle are 60°

⁴⁾ L is the length of sensor versions without flanges (weld-in version)

⁵⁾ B dimension value is an approximate information and may differ a little by flange pressure rate.

A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information in „Sensor SONO 3100 accessories and spare parts“ on page 3/267.

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Approximate weights for SONO 3100 sensor with ANSI B16.5 flanges

Nominal diameter		Weight [kg (lb)] ¹⁾			
DN [inch]	DN [mm]	CL150		CL300	
		[kg]	[lb]	[kg]	[lb]
4	100	32	70.5	35	77.2
5	125	38	83.8	44	97.0
6	150	45	99.2	52	114.6
8	200	58	127.9	79	174.2
10	250	75	165.3	117	257.9
12	300	92	202.8	151	332.9
14	350	113	249.1	-	-
16	400	141	310.9	-	-
20	500	207	456.4	-	-
24	600	276	608.5	-	-

¹⁾ Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lb). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lb).

Overview



SONOKIT is a transit time based ultrasonic flowmeter for retrofitting on existing pipelines.

The kit offers all necessary parts and special tools to make the installation as 1-path or 2-path flowmeter.

The set is made for installation on empty pipes or pipes under pressure without process shut-down (hot-tap).

Please contact Siemens for further information on hot-tap tools and instructions.

SONOKIT has inline transducers (in contact with media) which assure superior accuracy and performance.

Benefits

- Cost-effective solution – contains all the necessary components for retrofitting
- SONOKIT is easy to install in pipeline sizes DN 200 to DN 4000 (8" to 160") 1-path DN 100 to DN 2400 (4" to 96").
- No bypass installation necessary – withstands pressures up to 40 bar (580 psi) and media temperatures between -20 °C and +200 °C (-4 °F and +392 °F)
- High accuracy – the bigger the pipe, the more accurate the result
- Solid construction and no moving parts for a 100 % maintenance and obstruction-free flowmeter
- The SONOKIT comes with transducers in IP68 enclosure
- Available in a robust version that can be buried and withstands constant flooding
- Inline transducers assure superior accuracy and performance
- Automatic calculation of the calibration factor when pipe geometry data are entered in the transmitter
- FUS060 transmitter versions with HART or PROFIBUS PA
- FUS080 transmitter, battery or mains-powered

Application

- Raw water intake for water treatment plants
- Water distribution systems
- Irrigation systems
- Power generation (energy and water)
- District heating plants
- Cooling water plants within the industry and in power stations
- Systems within the oil and refinery business
- Sewage treatment plants
- Plants transporting non-conductive liquids

Design

The SONOKIT package box contains all necessary parts to build an ultrasonic flowmeter on existing pipes depending on choices at ordering:

- Papers to wrap around pipes for alignment of sensors
- Transducer alignment tools
- Mounting plates, transducer holders and SONO 3200 transducers
- Transducer cables
- SITRANS FUS060 or FUS080 transmitter for wall mounting
- 4-path version is available on request

Technical specifications

The transmitter related to this system is the SITRANS FUS080 or FUS060.

Technical specifications to the FUS060 see page 3/245 and to FUS080 see page 3/251.

Accuracy

Typical, depending on accuracy of measurements of installation

- 2-path: $\leq \pm (0.5 \dots 1.5 \%)$
- 1-path: $\leq \pm (1 \dots 3 \%)$

Note:

Accuracy depends on the accuracy of the measurements taken at location. This means that inaccurate measurements of angles, distance between transducers, wall thickness and pipe diameter have a direct effect on the accuracy. Values measured are entered into the memory of the FUS060 or FUS080 transmitter.

Requirements for pipes

Size	FUS060: DN 100 ... DN 4000 (4" ... 160") FUS080: DN 100 ... DN 1200 (4" ... 48")
Line pressure	max. 40 bar (580 psi)
Media temperature	
• Standard	-10 ... +200 °C (14 ... 392 °F)
• ATEX Ex d version	-20 ... +200 °C (-4 ... +392 °F)
• ATEX Ex i version	-10 ... +200 °C (+14 ... +392 °F)
• Specials	-200 °C (-328 °F) or up to 250 °C (482 °F)
Ambient temperature sensor	
• Standard and Ex-i version	-20 ... +60 °C (-4 ... +140 °F)
• Ex d version	-20 ... +180 °C (-4 ... +356 °F)
Transducer enclosure/ approvals/certificates	
Standard version	IP67 (NEMA 6)/IP68 (NEMA 6P)
Ex approval	System ATEX approval for SONO 3200 Ex i transducers together with transmitter FUS060-Ex: ATEX II 2G Ex dem [ia/lb] IIC T6/T4/T3 or ATEX II 2G Ex d IIC T3-T6 Gb with SONO 3200 Ex d transducers (for standard FUS060 transmitter, installed outside of Ex zone)
Material certificates	EN 10204-3.1 material certificate on transducer mounting parts
Transducer materials	
Terminal housing	Standard version: PA 6.6, 100 °C (212 °F) or stainless steel AISI 316, 200 °C (392 °F)
Transducer body	Standard version: Stainless steel AISI 316, 200 °C (392 °F)

Flow Measurement

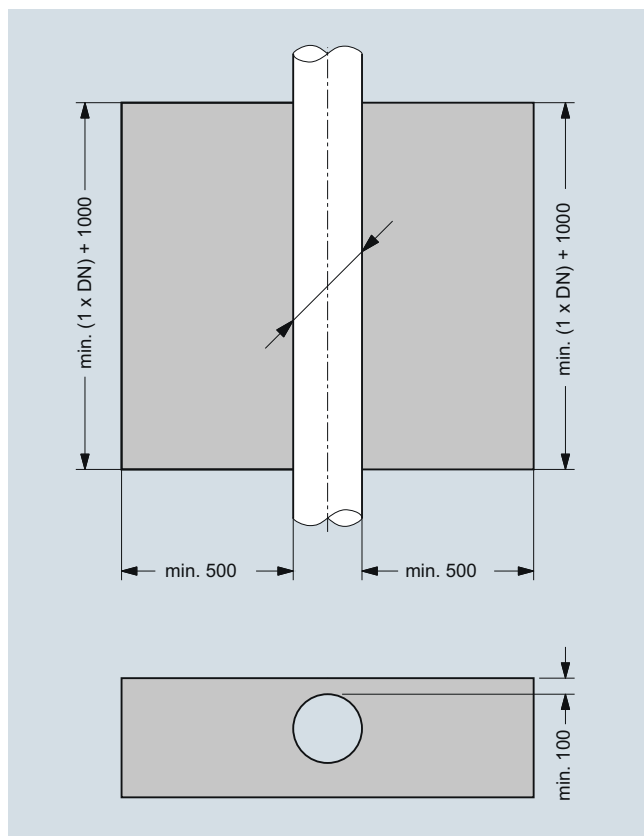
SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

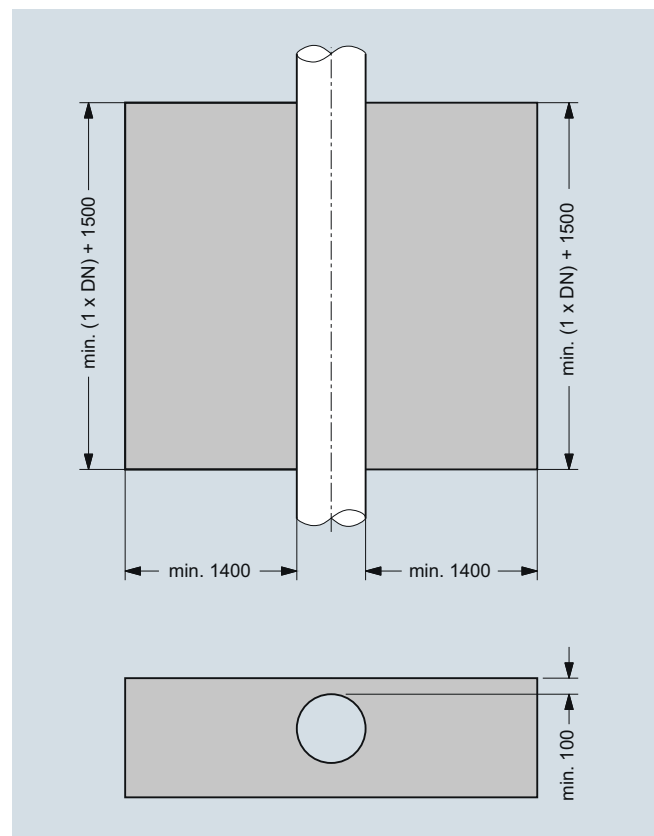
Materials of existing pipeline		Dimension of the package box (L x W x H, approx.)	856 x 390 x 344 mm (33.7" x 15.4" x 13.5")
Steel	Transducer holder: EN 10273 or EN 10216 (P235GH) Mounting plates ¹⁾ : EN 10273 or EN 10216 (P235GH)	Weight example of a package (standard 2-path with FUS060)	approx. 53 kg (116.8 lb)
Concrete	Transducer holder: Stainless steel AISI 316 or similar Mounting plates ¹⁾ : (not included)	Certificates and approvals	
Stainless steel	Transducer holder: Stainless steel AISI 316 or similar Mounting plates ¹⁾ : Stainless steel AISI 316 or similar	Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on a CD
Pipe wall thickness		Material certificate	Material certificate for the transducer parts according to EN 10204-3.1 is optionally available
Steel pipe (AISI 316 and St. 37.2 or corresponding material)	Transducer and holder available in length L = 160, allowing a pipe wall thickness up to 20 mm (0.79")	Approvals	No custody transfer approvals
Concrete pipe	Transducer and holder available in length L = 230, allowing a pipe wall thickness up to 200 mm (7.9") and pipe sizes ≥ DN 600	Information on PED approval: The SONOKIT includes the pipe mounting parts only and therefore it cannot be PED-approved. After the installation, all installation-related activities (welding, pressure test etc.) are the responsibility of the customer.	
		¹⁾ Mounting plates are only included for empty pipe installation types (refer to selection "A"). For tapping-band types holder and mounting plates are not included (refer to selection "C").	

Installation requirements





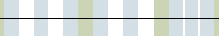


















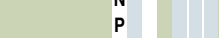

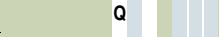















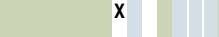



















































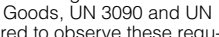

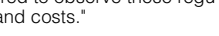




The space requirements (in mm) around the pipe for retrofitting a SITRANS F US ultrasonic flowmeter type SONOKIT are given below:



Empty pipe installation



Hot-tap installation

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS F US SONOKIT 1-path sensor		7ME3210 -		SITRANS F US SONOKIT 1-path sensor		7ME3210 -	
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data

Additional information

Please add „-Z“ to Article No. and specify Order code(s) and plain text.

Material certificate

EN 10204-3.1, transducer body material
 EN 10204-3.1, transducer holder material
 EN 10204-3.1, mounting plate material

F30
F31
F32

Tag name plate

Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).

Y17

Accessories

Alignment rods-set for DN 100 ... 650 (4" ... 26")
 Ø = 25 mm, L = 500 mm, 3 pcs.

S10

Alignment rods-set for DN 700 ... 1900 (28" ... 76")
 Ø = 25 mm, L = 500 mm, 6 pcs.

S11

Alignment rods-set for DN 2000 ... 2400 (80" ... 96")
 Ø = 25 mm, L = 500 mm, 8 pcs.

S12

Spanner key for transducer mounting type SONO 3200 O-ring type

T11

Tool set with various mounting/spare parts for SONOKIT installation

T12

Operating instructions

Description	Article No.
SITRANS FUS060	
• English	A5E01204521
• German	A5E02123845
SITRANS FUS080	
• English	A5E03059912
• German	A5E31628428
• Spanish	A5E31628493
• French	A5E31628438
SITRANS F US SONOKIT 1-path	
• English	A5E00814557
• German	A5E02610428
• Spanish	A5E02608231
• French	A5E02610419

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.



All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS F US SONOKIT 2-path sensor		7ME3220 -		SITRANS F US SONOKIT 2-path sensor		7ME3220 -	
							
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.							
Diameter	Qn setting [m³/h]			Transducer holder			
DN 200 (8")	380	2 F		None (for tapping band)	0		
DN 250 (10")	600	2 K		Carbon steel, length = 160 mm, mounting plates in carbon steel	1		
DN 300 (12")	850	2 P		Stainless steel, length = 160 mm, mounting plates in stainless steel	2		
DN 350 (14")	1000	2 T		Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 4000)	3		
DN 400 (16")	1300	3 B		Transducer type and approval			
DN 450 (18")	1700	3 F		IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval	1		
DN 500 (20")	2200	3 K		IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), EEx d, ATEX approval (only with standard FUS060)	2		
DN 550 (22")	2600	3 P		IP68 PA housing, Sylgard potting kit, PN 40, SS, O-ring, 100 °C (212 °F), no approval	3		
DN 600 (24")	3200	3 T		IP68 SS housing, Sylgard potting kit, PN 40, SS, O-ring, 200 °C (392 °F), no approval	4		
DN 650 (26")	3600	4 B		IP67 SS housing, PN 40, O-ring, 190 °C (374 °F), Ex i, ATEX approval (only with FUS060 Ex)	5		
DN 700 (28")	4200	4 F		Cable gland entires			
DN 750 (30")	4800	4 K		Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)	1		
DN 800 (32")	5500	4 P		Cable glands ½" NPT in transducers and in transmitter (only with FUS060)	2		
DN 900 (36")	7500	5 B		Transmitter version of SITRANS FUS060 (only DN 200 ... 4000 (8" ... 160"))			
DN 1000 (40")	9000	5 K		IP65 (NEMA 4), 120/230 V AC		N	
DN 1100 (44")	10 000	5 P		IP65 (NEMA 4), 24 V AC/DC		P	
DN 1200 (48")	13 200	5 T		IP65 (NEMA 4), 24 V AC/DC Ex version		Q	
<u>Only for FUS060</u>				Transmitter version of SITRANS FUS080 (only DN 200 ... 1200 (8" ... 48"))			
DN 1300 (52")	14 000	6 A		PDM software tool and IrDA-adaptor, which are needed for settings update, to be ordered separately, see FUS080 accessories			
DN 1400 (56")	16 800	6 C		IP67/NEMA 4X/6 115 ... 230 V AC		U	
DN 1500 (60")	19 000	6 E		IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack		V	
DN 1600 (64")	22 800	6 G		IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup		W	
DN 1700 (68")	25 000	6 J		IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ⁴⁾		X	
DN 1800 (72")	27 600	6 L		Transmitter output module			
DN 1900 (76")	31 000	6 N		Transmitter SITRANS FUS080:			
DN 2000 (80")	36 000	6 Q		Pulse and/or alarm output (standard for FUS080).		A	
DN 2100 (84")	37 000	6 S		Transmitter SITRANS FUS060:			
DN 2200 (88")	42 000	6 U		HART, 1 pulse output, 1 relay		B	
DN 2300 (92")	45 000	6 W		HART Ex version, 1 pulse output, 1 relay		C	
DN 2400 (96")	51 000	7 A		PROFIBUS PA, 1 pulse/frequency		D	
DN 2500 (100")	53 000	7 C					
DN 2600 (104")	60 000	7 E					
DN 2700 (108")	62 000	7 G					
DN 2800 (112")	72 000	7 J					
DN 2900 (116")	71 000	7 L					
DN 3000 (120")	78 000	7 N					
DN 3100 (124")	82 000	7 Q					
DN 3200 (128")	85 000	7 S					
DN 3300 (132")	92 000	7 U					
DN 3400 (136")	100 000	7 W					
DN 3500 (140")	100 000	8 A					
DN 3600 (144")	110 000	8 C					
DN 3700 (148")	120 000	8 E					
DN 3800 (152")	130 000	8 G					
DN 3900 (156")	130 000	8 J					
DN 4000 (160")	144 000	8 L					
Installation method²⁾							
Empty pipe (incl. transducer holder and mounting plates). Alignment rods and tools must be ordered as accessories.		A					
Hot tap, mounting under pressure (mounting plates not incl.). Special mounting tools to be ordered separately.		B					
SONOKIT for tapping band (DN 200 ... DN 1800) (transducer holder and mounting plates not incl., tapping band to be ordered separately) ¹⁾		C					

1) Tapping band via special request

2) Mounting tools must be ordered separately as "-Z" options

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data	Article No.	Ord. code
SITRANS F US SONOKIT 2-path sensor	7ME3220-	
Transducer coaxial cables (with FUS080 only, 15 and 30 m, 70°C (158 °F) cable types)		
4 x 3 m, max. 70 °C (158 °F), the only option for Ex i		0
4 x 15 m, max. 70 °C (158 °F)		1
4 x 30 m, high temp. max. 200 °C (392 °F)		2
4 x 30 m, max. 70 °C (158 °F)		3
4 x 60 m, max. 70 °C (158 °F) (up to DN 3000)		4
4 x 90 m, max. 70 °C (158 °F) (up to DN 3000)		5
4 x 120 m, max. 70 °C (158 °F) (up to DN 3000)		6
4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i		7
4 x 15 m, high temp. max. 200 °C (392 °F)		8
Special version (add Order code):		
No transducer cable, cable length 4 x 3 m, the only option for Ex i	9	R0A
No transducer cable, cable length 4 x 15 m	9	R0B
No transducer cable, cable length 4 x 30 m	9	R0C
No transducer cable, cable length 4 x 60 m (up to DN 3000)	9	R0D
No transducer cable, cable length 4 x 90 m (up to DN 3000)	9	R0E
No transducer cable, cable length 4 x 120 m (up to DN 3000)	9	R0F

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Article No. and specify Order code(s) and plain text.	
Material certificate	
EN 10204-3.1, transducer body material	F30
EN 10204-3.1, transducer holder material	F31
EN 10204-3.1, mounting plate material	F32
Tag name plate	
Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).	Y17
Accessories	
Alignment rods-set for DN 100 ... 750 (4" ... 30") Ø = 25 mm, L = 500 mm, 3 pcs.	S10
Alignment rods-set for DN 800 ... 2100 (32" ... 84") Ø = 25 mm, L = 500 mm, 6 pcs.	S11
Alignment rods-set for DN 2200 ... 4000 (88" ... 160") Ø = 25 mm, L = 500 mm, 8 or 10 pcs.	S12
Spanner key for transducer mounting type SONO 3200 O-ring type	T11
Tool set with various mounting/spare parts for SONOKIT installation	T12

Operating instructions

Description	Article No.
SITRANS FUS060	
• English	A5E01204521
• German	A5E02123845
SITRANS FUS080	
• English	A5E03059912
• German	A5E31628428
• Spanish	A5E31628493
• French	A5E31628438
SITRANS F US SONOKIT 2-path	
• English	A5E02445496
• German	A5E02554972
• Spanish	A5E02555037
• French	A5E02555044
• Czech	A5E02814192

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>




Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com



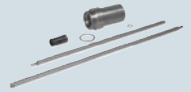
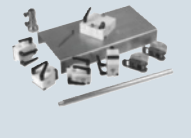
Flowmeter SONOKIT accessories and spare parts


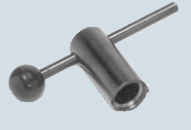
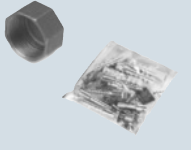
Accessories

Potting kit for SONO 3200 terminal housing

Description	Article No.	
Potting kit for terminal box of SONO 3200 transducers for IP68/NEMA 6P (not for Ex sensors)	FDK:085L2403	

Tools for SONO 3200 transducers and SONOKIT

Description	Article No.	
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure and for hot-tapping (working conditions: typically water, max. 40 bar and max. 60 °C (max. 580 psi and max. 140 °F)) For transducer length:		
• Up to 160 mm (6.3")	FDK:085B5333	
• Up to 230 mm (9.1")	FDK:085B5335	
Angle measurement tool for SONOKIT	FDK:085B5330	
Hot-tap drilling tool for SONOKIT, the extraction tool is required, max. pressure 40 bar (580 psi)	FDK:085B5392	
Alignment tool for SONOKIT (typically for hot-tapping) For use on pipe sizes in the range DN 300 to DN 1200.	FDK:085B5393	

Description	Article No.	
Alignment rods-set for DN 100 ... 650 (4" ... 26"), Ø = 25 mm, L = 500 mm, 3 pcs.	A5E02609214	
Alignment rods-set for DN 700 ... 1900 (28" ... 76"), Ø = 25 mm, L = 500 mm, 6 pcs.	A5E02609215	
Alignment rods-set for DN 2000 ... 4000 (80" ... 160"), Ø = 25 mm, L = 500 mm, 10 pcs.	A5E02609216	
Spanner key for transducer mounting type SONO 3200 O-ring type	A5E02609218	
Tool set with various mounting/spare parts for SONOKIT installation	A5E02609219	

Flow Measurement


SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Cable connection boxes

(For the connection of individual transducer cables with the FUS060 transducer cables)


Description	Article No.
Junction box for coaxial cable	
• IP68 metal box for 2 coaxial cables	FDK:085B1360
• IP68 metal box for 4 coaxial cables	FDK:085B1361
• IP68 EEx e plastic box for 2 coaxial cables, no ATEX approval	FDK:085B1362
• IP68 EEx e plastic box for 4 coaxial cables, no ATEX approval	FDK:085B1363



Spare parts

Transducer SONO 3200 spare parts, complete transducer with 1/2"-NPT cable glands


Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Article No.
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 ... +100 (-4 ... +212)	160 (6.3)	A5E00839476
O-ring	316 SS	O-ring	PN 40	316 SS		-20 ... +200 ¹⁾ (-4 ... +392)	160 (6.3)	A5E00839435
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 ... +100 (-4 ... +212)	230 (9.41)	A5E00839477
O-ring	316 SS	O-ring	PN 40	316 SS		-20 ... +200 ¹⁾ (-4 ... +392)	230 (9.41)	A5E00839437



¹⁾ 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) media temp. but cable glands only for -20 ... +100 °C (-4 ... +212 °F) ambient temp.

Transducer SONO 3200 spare parts, complete transducer with M20 cable glands

Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Article No.
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 ... +100 (-4 ... +212)	160 (6.3)	FDK:085B5454
O-ring	316 SS	O-ring	PN 40	316 SS		-20 ... +200 ¹⁾ (-4 ... +392)	160 (6.3)	FDK:085B5455
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 ... +100 (-4 ... +212)	230 (9.41)	FDK:085B5458
O-ring	316 SS	O-ring	PN 40	316 SS	Ex d ²⁾	-20 ... +200 (-4 ... +392)	160 (6.3)	FDK:085B5452
O-ring	316 SS	O-ring	PN 40	316 SS	Ex i ³⁾	-10 ... +200 (14 ... 392)	160 (6.3)	A5E00836462
O-ring	316 SS	O-ring	PN 40	316 SS		-20 ... +200 ²⁾ (-4 ... +392)	230 (9.41)	FDK:085B5459




¹⁾ 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) media temp. but cable glands only for -20 ... +100 °C (-4 ... +212 °F) ambient temp.

²⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb

³⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

Transducer SONO 3200 spare parts, transducer terminal housing with M20 cable glands

Type	Article No.
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	FDK:085B5501
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	FDK:085B5504
Material: AISI 316, Ex d ¹⁾ , Temperature range: -20 ... +200 °C (-4 ... +392 °F)	FDK:085B5505
Material: AISI 316, Ex i ²⁾ , Temperature range: -10 ... +200 °C (14 ... 392 °F)	A5E00835255




¹⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb


²⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer SONO 3200 spare parts, transducer terminal housing with 1/2"-NPT cable glands


Type	Article No.	
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	A5E00839460	
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	A5E00839427	

Transducer SONO 3200 spare parts transducer body with insert as well as insert only


Temperature range [°C (°F)]	Gasket	Length [mm (inch)]	Article No.	
-20 ... +200 (-4 ... +392)	O-ring (FFKM O-ring material) ¹⁾	160 (6.3)	FDK:085B1406	
-20 ... +200 (-4 ... +392)	O-ring (FKM 602 O-ring material) ²⁾	160 (6.3)	FDK:085B5510	
-20 ... +200 (-4 ... +392)	O-ring	230 (9.41)	FDK:085B5511	

¹⁾ Chemical resistant O-ring material. Body specially for Ex-approved transducers.


²⁾ Body specially for standard transducers.

Temperature range [°C (°F)]	Length [mm (inch)]	Article No.	
-20 ... +200 (-4 ... +392)	160 (6.3)	FDK:085B1419	
-20 ... +200 (-4 ... +392)	230 (9.41)	FDK:085B1420	


Transducer SONO 3200 gasket

Type	Pressure rating	Material	Temperature range [°C (°F)]	Article No.	
Gasket O-ring (3 pcs. for O-ring transducers)	PN 40	FKM	-20 ... +200 (-4 ... +392)	FDK:085B1089	

Cables for SONOKIT SONO 3200 transducers with FUS060

Description	Length [m (ft)]	Article No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101	
	15 (49.21)	A5E00861432	
	30 (98.43)	A5E01278662	
	60 (196.85)	A5E01278682	
	90 (295.28)	A5E01278687	
	120 (393.70)	A5E01278698	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC transmitter part with SMB plug, max. 70 °C (158 °F); (Impedance 75 Ω) (2 pcs.)	3 (9.84)	A5E00875105	
	15 (49.21)	A5E00861435	
	30 (98.43)	A5E01196952	

Cables for SONOKIT SONO 3200 transducers with FUS080

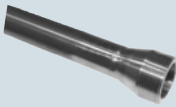
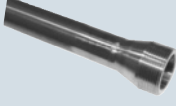
Description	Length [m (ft)]	Article No.	
Coaxial cable for FUS080, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	15 (49.21)	A5E02478541	
	30 (98.43)	A5E02478751	

Flow Measurement

SITRANS F US Inline

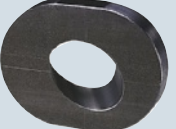
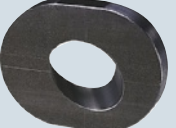
Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer holder for SONOKIT SONO 3200 transducers

Description	Article No.	
1-path (each incl. 1 pc.)		
• 160 mm (6.3") stainless steel 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1103	
• 160 mm (6.3") carbon steel 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1102	
• 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 2400 (24" ... 96")	FDK:085L1107	
• 160 mm (6.3") stainless steel 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1105	
• 160 mm (6.3") carbon steel 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1104	
2-path (each incl. 1 pc.)		
• 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 4000 (24" ... 160")	FDK:085L1111	
• 160 mm (6.3") stainless steel 60°, DN 200 ... DN 4000 (8" ... 160")	FDK:085L1109	
• 160 mm (6.3") carbon steel 60°, DN 200 ... DN 4000 (8" ... 160")	FDK:085L1108	

The other transducer holder parts are either completely in stainless steel for the concrete and stainless steel pipes (AISI 316L/1.4404 or similar). For carbon pipes the part welded onto the pipe is in carbon steel (St.37 or similar). Thread part is stainless steel (AISI 316L/1.4404 or similar).

Mounting plate for SONOKIT SONO 3200 transducers

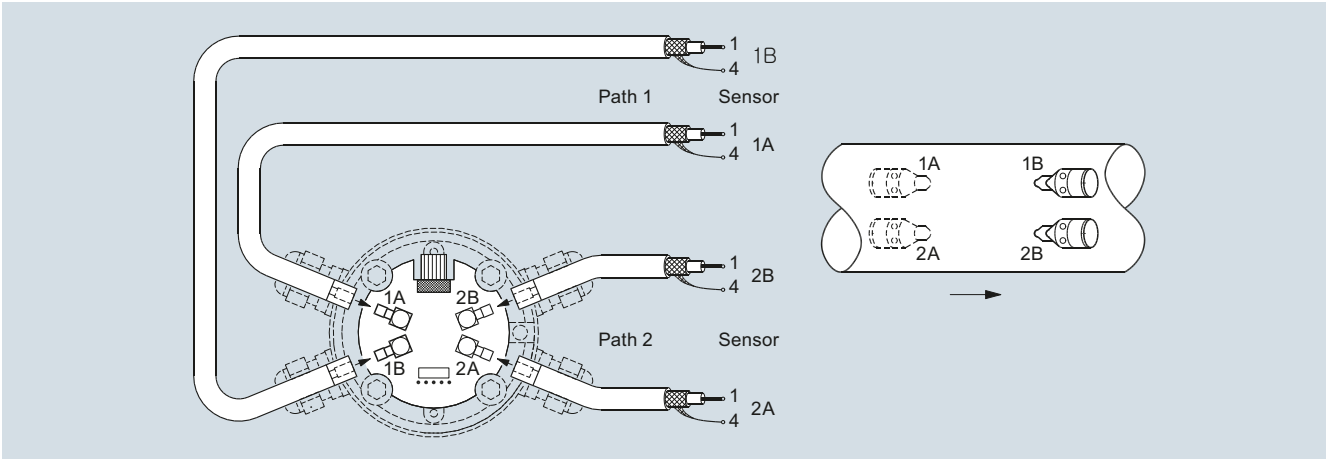
Description	Article No.	
1-path (each incl. 1 pc.)		
• Stainless steel plate, 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1113	
• Carbon steel plate, 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1112	
• Stainless steel plate, 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1115	
• Carbon steel plate, 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1114	
2-path (each incl. 1 pc.)		
• Stainless steel plate, 60°, DN 200 ... DN 4000 (8" ... 160")	FDK:085L1119	
• Carbon steel plate, 60°, DN 200 ... DN 4000 (8" ... 160")	FDK:085L1118	

The mounting plates are either in stainless steel (AISI 316L/1.4404 or similar) or carbon steel (St.37 or similar).

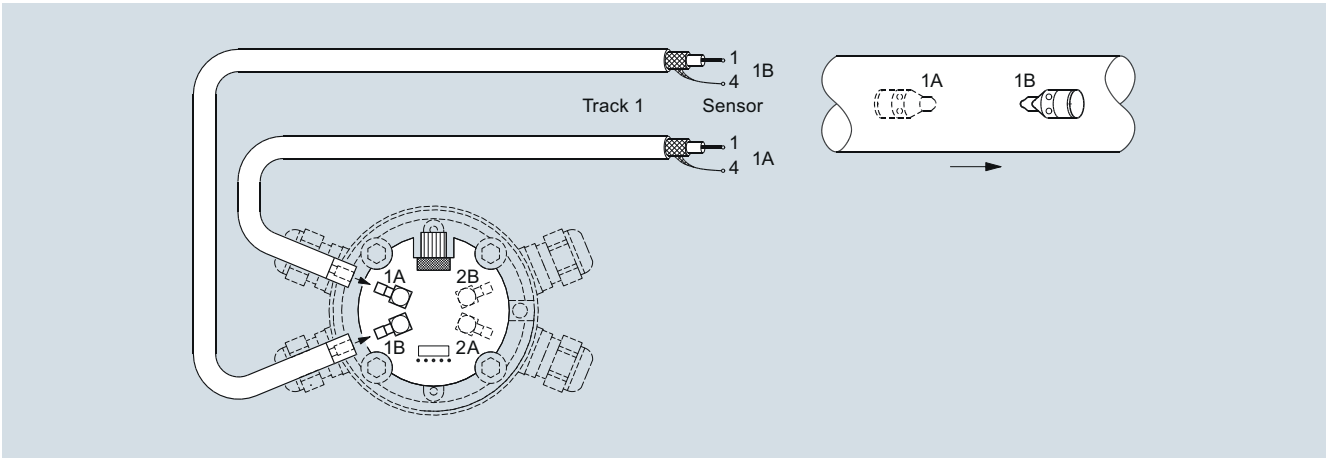
SONO 3200 cable glands

Type/description	Temperature range [°C (°F)]	Appr	Article No.	
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		A5E02246304	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		A5E02246309	
½" NPT chrome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		A5E02246258	
M20 stainless steel, cable Ø 4 ... 6 mm	-25 ... 200 (-13 ... +392)	Ex i	A5E02246194	
M20 stainless steel, cable Ø 5 ... 8 mm	-60 ... 180 (-76 ... +356)	Ex d	A5E02246311	

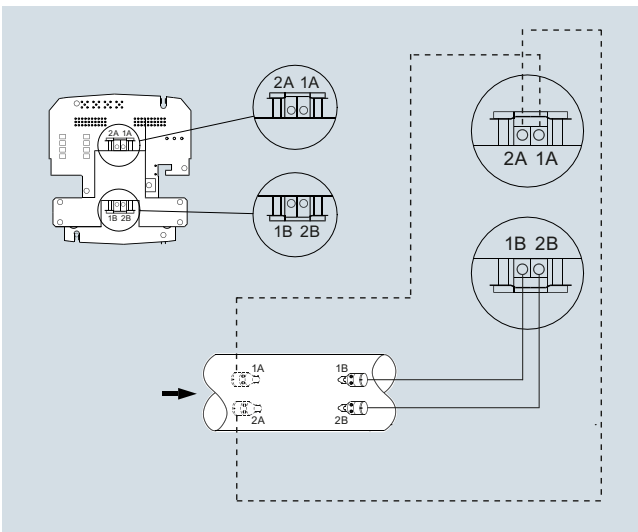
Schematics



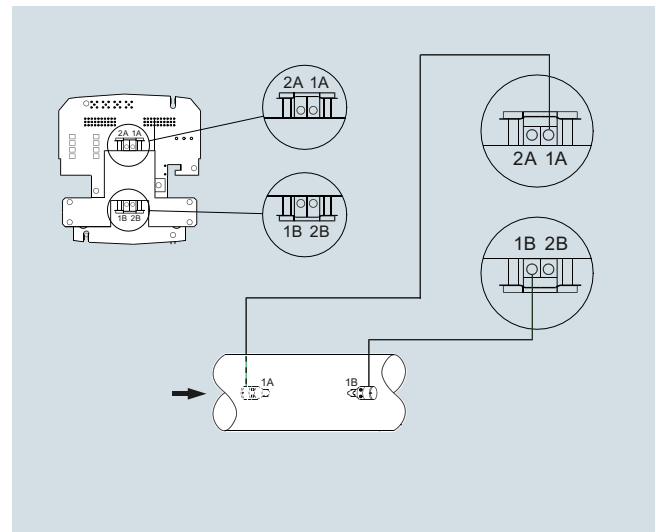
Electrical connection of SITRANS FUS060 and SONOKIT 2-path. Max. 30 m transducer cable length for sizes \geq DN 3000.



Electrical connection of SITRANS FUS060 and SONOKIT 1-path



Electrical connection of SITRANS FUS080 and SONOKIT 2-path



Electrical connection of SITRANS FUS080 and SONOKIT 1-path

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Overview



The 2-path flowmeter SITRANS FUS380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.

The type-approved flowmeter version is named SITRANS FUE380 - see page 3/289.

Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-path measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on most district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i (min) : Q_s (max) up to 1:400

Application

The main application for SITRANS FUS380 is measurement of water flow or water flow in energy meter systems in district heating networks or chilled water.

Design

The 2-path design of SITRANS FUS380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUS380 has two digital output functions that can be individually selected.

Pulse output rate is defined when ordering. To get optimal benefit the pulse value must be selected as low as possible.

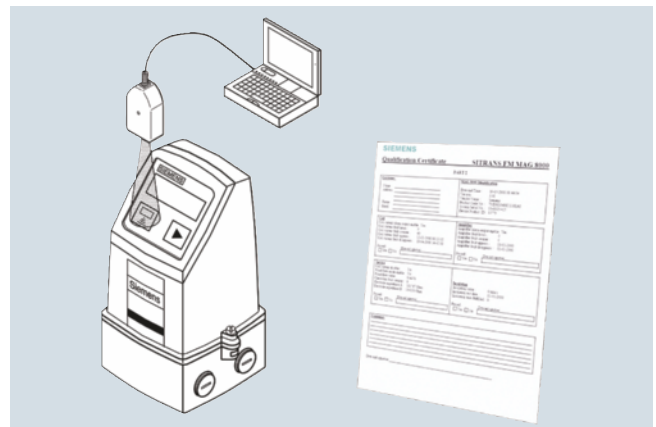
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Function

Together with the SIMATIC PDM tool the FUS380 offers the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with specific data that defines the quality status of the measurement.

The Qualification Certificate shows information about the actual status of the flowmeter:

- General settings, flowmeter and battery information, totalizer values, and pulse output settings
- Detailed information about the transmitter and the sensor functionality, and a main parameter list for evaluating the functionality of the flowmeter



Configuration SITRANS FUS380

Selection guide SITRANS FUS380, standard version

DN	Q _s (m ³ /h)	Q _{max} (m ³ /h) (105 % of Q _s)	Q _p (m ³ /h)	Q _i (m ³ /h) (1:100 of Q _p)	Cut-off (m ³ /h)	Cut-off (% of Q _{max})	Typical pulse value ¹⁾ (l/pulse)
50	15	15.75	15	0.15	0.075	0.48	1
50	45	47.25	15	0.15	0.075	0.16	1
50	45	47.25	30	0.3	0.150	0.32	1
65	25	26.25	25	0.25	0.125	0.48	1
65	72	75.6	25	0.25	0.125	0.17	1
65	72	75.6	50	0.5	0.250	0.33	1
80	40	42	40	0.4	0.200	0.48	2.5
80	120	126	40	0.4	0.200	0.16	2.5
80	120	126	80	0.8	0.400	0.32	2.5
100	60	63	60	0.6	0.300	0.48	2.5
100	180	189	60	0.6	0.300	0.16	2.5
100	240	252	120	1.2	0.600	0.24	2.5
125	10	10.5	100	1	0.500	4.76	2.5
125	280	294	100	1	0.500	0.17	2.5
125	400	420	200	2	1.000	0.24	2.5
150	150	157.5	150	1.5	0.750	0.48	10
150	420	441	150	1.5	0.750	0.17	10
150	560	588	300	3	1.500	0.26	10
200	250	262.5	250	2.5	1.250	0.48	10
200	700	735	250	2.5	1.250	0.17	10
200	900	945	500	5	2.500	0.26	10
250	400	420	400	4	2.000	0.48	10
250	1 120	1 176	400	4	2.000	0.17	10
250	1 400	1 470	800	8	4.000	0.27	10
300	560	588	560	5.6	2.800	0.48	50
300	1 560	1 638	560	5.6	2.800	0.17	50
300	2 100	2 205	1 120	11.2	5.600	0.25	50
350	750	787.5	750	7.5	3.750	0.48	50
350	2 100	2 205	750	7.5	3.750	0.17	50
350	2 800	2 940	1 500	15	7.500	0.26	50
400	950	9 97.5	950	9.5	4.750	0.48	50
400	2 660	2 793	950	9.5	4.750	0.17	50
400	3 600	3 780	1 900	19	9.500	0.25	50
500	1 475	1 548.75	1 475	14.75	7.375	0.48	100
500	4 130	4 336.5	1 475	14.75	7.375	0.17	100
500	5 500	5 775	2 950	29.5	14.750	0.26	100
600	2 150	2 257.5	2 150	21.5	10.750	0.48	100
600	6 020	6 321	2 150	21.5	10.750	0.17	100
600	8 000	8 400	4 300	43	21.500	0.26	100
700	2 900	3 045	2 900	29	14.500	0.48	100
700	8 120	8 526	2 900	29	14.500	0.17	100
700	10 800	11 340	5 800	58	29.000	0.26	100
800	3 800	3 990	3 800	38	19.000	0.48	100
800	10 640	11 172	3 800	38	19.000	0.17	100
800	14 200	14 910	7 600	76	38.000	0.25	100
900	5 000	5 250	3 800	38	19.000	0.36	100
900	14 000	14 700	5 000	50	25.000	0.17	100
900	20 000	21 000	5 000	50	25.000	0.12	100
1 000	6 000	6 300	3 800	38	19.000	0.30	100
1 000	16 800	17 640	6 000	60	30.000	0.17	100
1 000	24 000	25 200	12 000	120	60.000	0.24	100
1 200	9 000	9 450	3 800	38	19.000	0.20	100
1 200	25 200	26 460	9 000	90	45.000	0.17	100
1 200	36 000	37 800	18 000	180	90.000	0.24	100

The values Q_i, Q_p and Q_s are shown on the system label of the FUS380. Q_i (Q_{min}) means the minimal and Q_p (Q_{nom}) the nominal flow rate. Q_s is the highest operatable flow rate. The maximum flow rate (Q_{max}) is 105 % of Q_s. The low flow cut-off is 50 % of Q_i.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow.

To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms: L/pulse > Q_s (m³/h) /360.

For example Q_s = 300 m³/h; L/pulse > 300/360; L/pulse > 0.83; therefore the pulse value must be 1 l/pulse

¹⁾ Typical pulse values for SITRANS FUS380 with pulse length 5 ms. Other values are possible - please see the selections at the 7ME340 Order codes.

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Technical specifications

Sensor design	2-path sensor with flanges and inline transducers wet-calibrated from factory
Nominal size (DN 50 ... DN 80 in bronze)	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1 flanges: • type 01: DN 100 to DN 125 • type 11: DN 150 to DN 1200 • type 11 'design': DN 50 to DN 80
Pipe material	• DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. • DN 50 ... DN 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN 1982)
Transducer design	• DN 100 ... DN 1200: Inline version and welded onto the pipe • DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn ₃₆ Pb ₂ As)

Sensor operating conditions

Ambient temperature	
• Operation	-10 ... +60 °C (14 ... 140 °F) (MID version: -10 ... +55 °C (14 ... 131 °F))
• Storage	-40 ... +85 °C (-40 ... +185 °F)
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTUV information sheet 1466 and AGFW information sheet FW 510.
Media/surface temperature	
• DN 100 ... DN 1200	Remote: 2 ... 200 °C (35.6 ... 392 °F)
• DN 50 ... DN 80	Remote: 2 ... 150 °C (35.6 ... 302 °F)
• DN 50 ... DN 1200	Compact: 2 ... 120 °C (35.6 ... 248 °F)
Degree of protection	Sensor connection IP67/NEMA 4X/6
Max. flow velocity	DN 50 ... DN 1200: 9 m/s (29.5 ft/s)
Electromagnetic compatibility	
• Emitted interference	To EN 55011/CSPRI-11
• Noise immunity	To EN/IEC 61236-1 (Industry)

Transmitter

The transmitter related to this system is the SITRANS FUS080. Technical specifications to the FUS080 see page 3/251 ff.

Sensor cable

Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
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Certificates and approvals

Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according EN 3.1 is optionally available
Calibration report	A standard calibration report is shipped with every flowmeter. Extended accredited ISO/IEC 17025 calibration certificates optionally available
Approvals	No custody transfer approvals

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

SITRANS FUS380 uncertainty

	FUS380
Flow value setting	Predefined settings according to dimension
Approval	No approval
Flow rate v_f	0.02 ... 9 m/s (0.065 ... 29.5 ft/s)
Output A	Pulse: forward, reverse, forward net, reverse net (Preset: forward)
Output B	Pulse (forward, reverse, forward net, reverse net, alarm, call-up (Preset: alarm))
Pulse value A & B (depending on DN value)	0.1 l/p, 0.25 l/p, 0.5 l/p, 1 l/p, 2.5 l/p, 10 l/p, 25 l/p, 50 l/p, 100 l/p, 250 l/p, 500 l/p, 1 m ³ /p, 2.5 m ³ /p, 5 m ³ /p, 10 m ³ /p, 25 m ³ /p, 50 m ³ /p, 100 m ³ /p, 250 m ³ /p, 500 m ³ /p, 1000 m ³ /p
Pulse width	5/10/20/50/100/200/500 ms
Flow unit setup	Preset: m ³ /h
Volume unit setup	Preset: m ³

Flowmeter Calibration and traceability

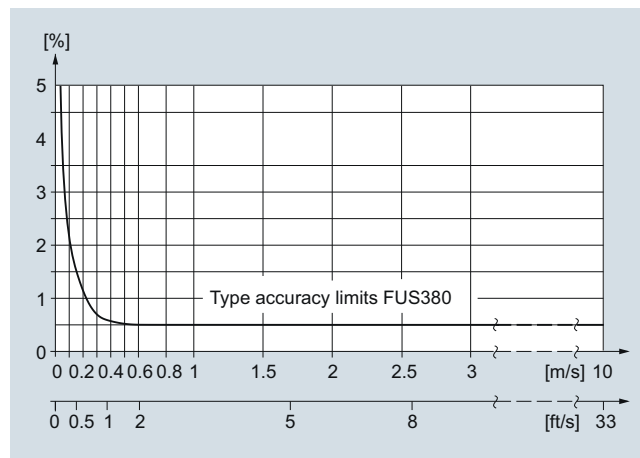
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability). Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

A standard calibration certificate with Q_n as selected flow is shipped with each SITRANS FUS380. This production calibration protocol consists of 2 x 3 points at Q_i , 10 % Q_p and Q_p (max. 4 200 m³/h).

Accuracy SITRANS FUS380:

± 0.5 % for 0.5 m/s < v < 10 m/s and ± 0.25/V_{act} [%] below 0.5 m/s



Selection and Ordering data Article-No. Order code

Flowmeter SITRANS FUS380 (standard)

7 ME 3 4 0 0 -

0 - A

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter	Flow setting [m ³ /h]		Article-No.
	Q _p (Q _n) ¹⁾	Q _s	
DN 50 (2") ²⁾	15	15	1 A
DN 50 (2") ²⁾	15	45	1 C
DN 50 (2") ²⁾	30	45	1 D
DN 65 (2½") ²⁾	25	25	1 E
DN 65 (2½") ²⁾	25	72	1 G
DN 65 (2½") ²⁾	50	72	1 H
DN 80 (3") ²⁾	40	40	1 J
DN 80 (3") ²⁾	40	120	1 L
DN 80 (3") ²⁾	80	120	1 M
DN 100 (4")	60	60	1 N
DN 100 (4")	60	180	1 Q
DN 100 (4")	120	240	1 R
DN 125 (5")	100	100	1 S
DN 125 (5")	100	280	1 U
DN 125 (5")	200	400	1 V
DN 150 (6")	150	150	2 A
DN 150 (6")	150	420	2 C
DN 150 (6")	300	560	2 D
DN 200 (8")	250	250	2 E
DN 200 (8")	250	700	2 G
DN 200 (8")	500	900	2 H
DN 250 (10")	400	400	2 J
DN 250 (10")	400	1 120	2 L
DN 250 (10")	800	1 400	2 M
DN 300 (12")	560	560	2 N
DN 300 (12")	560	1 560	2 Q
DN 300 (12")	1 120	2 100	2 R
DN 350 (14")	750	750	2 S
DN 350 (14")	750	2 100	2 U
DN 350 (14")	1 500	2 800	2 V
DN 400 (16")	950	950	3 A
DN 400 (16")	950	2 660	3 C
DN 400 (16")	1 900	3 600	3 D
DN 500 (20")	1 475	1 475	3 J
DN 500 (20")	1 475	4 130	3 L
DN 500 (20")	2 950	5 500	3 M
DN 600 (24")	2 150	2 150	3 S
DN 600 (24")	2 150	6 020	3 U
DN 600 (24")	4 300	8 000	3 V
DN 700 (28")	2 900	2 900	4 E
DN 700 (28")	2 900	8 120	4 G
DN 700 (28")	5 800	10 800	4 H
DN 800 (32")	3 800	3 800	4 N
DN 800 (32")	3 800	10 640	4 Q
DN 800 (32")	7 600	14 200	4 R
DN 900 (36")	5 000	5 000	5 A
DN 900 (36")	5 000	14 000	5 C
DN 900 (36")	10 000	20 000	5 D
DN 1 000 (40")	6 000	6 000	5 J
DN 1 000 (40")	6 000	16 800	5 L
DN 1 000 (40")	12 000	24 000	5 M
DN 1 200 (48")	9 000	9 000	5 S
DN 1 200 (48")	9 000	25 200	5 U
DN 1 200 (48")	18 000	36 000	5 V

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.

Selection and Ordering data Article-No. Order code

Flowmeter SITRANS FUS380 (standard)

7 ME 3 4 0 0 -

0 - A

Flange norm and pressure rating

System without sensor - only a transmitter FUS080 as spare part - settings as defined with this Article No.

EN 1092-1 Flanges

- PN 16 (DN 100 ... DN 1 200)
- PN 25 (DN 200 ... DN 1 000)
- PN 40 (DN 50 ... DN 250)³⁾

Compact/remote connection

Compact version, max. 120 °C (248 °F)

Remote version, max. 150/200 °C (302/392 °F)

- 5 m (16.4 ft)
- 10 m (32.8 ft)
- 20 m (65.6 ft)
- 30 m (98.4 ft)

Pulse output value setup⁵⁾

0.1 l/p

1 l/p

2.5 l/p

10 l/p

50 l/p

100 l/p

250 l/pulse

1 m³/pulse

0.25 l/pulse

0.5 l/pulse

5 l/pulse

25 l/pulse

500 l/pulse

2.5 m³/pulse5 m³/pulse10 m³/pulse25 m³/pulse50 m³/pulse100 m³/pulse250 m³/pulse500 m³/pulse1000 m³/pulse

Transmitter version of SITRANS FUS080

IP67/NEMA 4X/6 115 ... 230 V AC

IP67/NEMA 4X/6 3.6 V battery version, incl.

dual battery pack⁴⁾

IP67/NEMA 4X/6 115 ... 230 V AC,

including 3.6 V single battery backup⁴⁾

IP67/NEMA 4X/6 3.6 V battery version

(no battery pack included)

Pulse width setup

5 ms (standard)

10 ms

20 ms

50 ms

100 ms

200 ms

500 ms

- ¹⁾ Q_p (Q_n) is the normal or typical flow. Q_p and Q_s is shown on the system label.
- ²⁾ Pipe material bronze brass.
- ³⁾ PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes.
- ⁴⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.
- ⁵⁾ To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms:
L/pulse > Q_s (m³/h) / 360.
For example Q_s = 300 m³/h; L/pulse > 300/360;
L/pulse > 0.83; therefore the pulse value must be 1 l/pulse

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Selection and Ordering data	Order code
Additional information Please add „-Z“ to Article No. and following add-on code(s) with plain text.	
Calibration/certificate FUS380 Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter. Incl. Calibration protocol: 2 x 3 points, Q_i , 10 % Q_p and Q_p (max. 8000 m ³ /h).	Included
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 50 % and 100 % of Q_p (max. 630 m ³ /h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN 250 ... DN 600 with Q_n as selected in diameter. Certificate: 2 x 5 points, 5 %, 10 %, 50 % and 100 % of Q_p (max. 2800 m ³ /h).	D21
Accredited Siemens ISO/IEC 17025 calibration, DN 500 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 50 % and 100 % of Q_p (max. 8000 m ³ /h).	D22
Output B as reverse flow pulses. No calibration/verification of this function.	E21
Material certificate EN 10204-3.1 (pipe material)	F10
Tag name plate Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).	Y17

Flowmeter SITRANS FUS380 operating instructions, accessories and spare parts

Operating instructions

Description	Article No.
• English	A5E00730100
• German	A5E00740611
• Spanish	A5E00754188
• French	A5E00754173

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

For accessories and spare parts see chapter of transmitter SITRANS FUS080/FUE080 on page 3/254.



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Overview



The 2-path flowmeter SITRANS FUE380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.

The flowmeter FUE380 is approved according to energy meter standards EN 1434 class 2, OIML R 75 class 2 and MID class 2. Metrological parameters are protected against manipulation. The type-approved flowmeter version is named SITRANS FUE380. For a standard flowmeter type FUS380 without a type approval, see separate FUS380 chapter.

Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-path measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on most district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range $Q_i:Q_p$ up to 1:50/100 or max. range $Q_i:Q_s$ up to 1:400

Application

The main application for SITRANS FUE380 is measurement of water flow or water flow in energy meter systems for custody transfer in district heating networks or chilled water.

Combined with an energy calculator and a pair of temperature sensors, SITRANS FUE380 can be used as part of an energy meter system. For this purpose Siemens offers energy calculator SITRANS FUE950.

Design

The 2-path design of SITRANS FUE380 ensures maximum accuracy under short inlet conditions. The approved flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUE080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

FUE380 MI-004 approval

The SITRANS FUE380 program is type-approved according to international energy meter standard EN 1434. On 1 November 2006 the MI-004 energy meter directive became effective providing that all energy meters with a MI-004 verification label can be sold across the EU borders.

The FUE380 are MI-004 verified and labeled products according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-004, in sizes from DN 50 to DN 1200.

The MID certification is obtained as module B + module D approvals according to the above-mentioned directive.

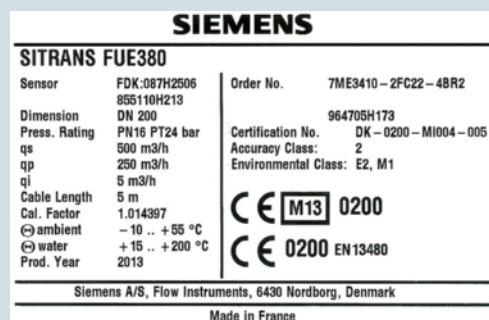
Module B: MI-004 Type MID approval according to EN 1434: 2007

Module D: Quality insurance MID approval of production

The MID system label with the approval information is placed on the side of the transmitter and on the sensor. An example of the product label is shown below:



FUE380 transmitter label (with MID first verification)



FUE380 sensor label (with MID first verification)

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading. SITRANS FUE380 has two digital output functions that can be individually selected.

Pulse output rate is defined when ordering. To get optimal benefit the pulse value must be selected as low as possible.

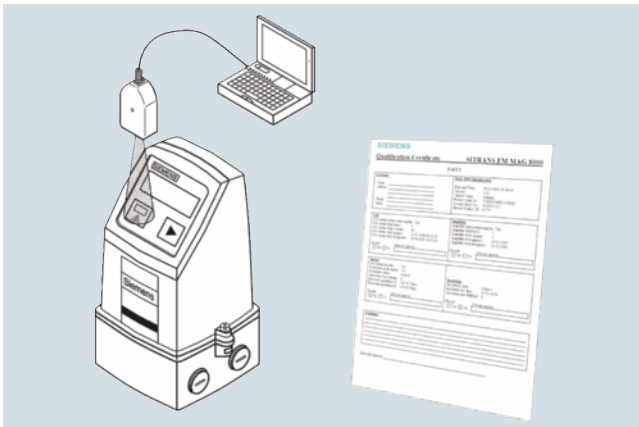
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Function

Together with the SIMATIC PDM tool the FUE380 offers the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with specific data that defines the quality status of the measurement.

The Qualification Certificate shows information about the actual status of the flowmeter:

- general settings, flowmeter and battery information, totalizer values, and pulse output settings
- detailed information about the transmitter and the sensor functionality, and a main parameter list for evaluating the functionality of the flowmeter



Configuration SITRANS FUE380 type-approved

Selection guide SITRANS FUE380, type-approved flowmeter

DN	Q _s (m ³ /h)	Q _{max} (m ³ /h) (105 % of Q _s)	Q _p (m ³ /h)	Q _i (m ³ /h) (1:50 of Q _p) ⁴⁾	Q _i (m ³ /h) (1:100 of Q _p) ⁴⁾	Cut-off (m ³ /h)	Cut-off (% of Q _{max})	Typical pulse value ⁵⁾ (l/pulse)
50	30	31.5	15 ²⁾	0.3	-	0.075	0.24	1
50	45	47.25	15 ²⁾	0.3	-	0.075	0.16	1
50	45	47.25	30 ³⁾	-	0.30	0.150	0.32	1
65	50	52.5	25 ²⁾	0.5	-	0.125	0.24	1
65	72	75.6	25 ²⁾	0.5	-	0.125	0.17	1
65	72	75.6	50 ³⁾	-	0.50	0.250	0.33	1
80	80	84	40 ²⁾	0.8	-	0.200	0.24	2.5
80	120	126	40 ²⁾	0.8	-	0.200	0.16	2.5
80	120	126	80 ³⁾	-	0.80	0.400	0.32	2.5
100	120	126	60 ²⁾	1.2	-	0.300	0.24	2.5
100	180	189	60 ²⁾	1.2	-	0.300	0.16	2.5
100	180	189	120 ³⁾	-	1.20	0.600	0.32	2.5
125	200	210	100 ²⁾	2.0	-	0.500	0.24	2.5
125	280	294	100 ²⁾	2.0	-	0.500	0.17	2.5
125	280	294	200 ³⁾	-	2.00	1.000	0.34	2.5
150	300	315	150 ²⁾	3.0	-	0.750	0.24	10
150	420	441	150 ²⁾	3.0	-	0.750	0.17	10
150	420	441	300 ³⁾	-	3.00	1.500	0.34	10
200	500	525	250 ²⁾	5.0	-	1.250	0.24	10
200	700	735	250 ²⁾	5.0	-	1.250	0.17	10
200	700	735	500 ³⁾	-	5.00	2.500	0.34	10
250	800	840	400 ²⁾	8.0	-	2.000	0.24	10
250	1 120	1 176	400 ²⁾	8.0	-	2.000	0.17	10
250	1 120	1 176	800 ³⁾	-	8.00	4.000	0.34	10
300	1 120	1 176	560 ²⁾	11.2	-	2.800	0.24	50
300	1 560	1 638	560 ²⁾	11.2	-	2.800	0.17	50
300	1 560	1 638	1120 ³⁾	-	11.20	5.600	0.34	50
350	1 500	1 575	750 ²⁾	15.0	-	3.750	0.24	50
350	2 100	2 205	750 ²⁾	15.0	-	3.750	0.17	50
350	2 100	2 205	1 500 ³⁾	-	15.00	7.500	0.34	50
400	1 900	1 995	950 ²⁾	19.0	-	4.750	0.24	50
400	2 660	2 793	950 ²⁾	19.0	-	4.750	0.17	50
400	2 660	2 793	1 900 ³⁾	-	19.00	9.500	0.34	50
500	2 950	3 097.5	1 475 ²⁾	29.5	-	7.375	0.24	100
500	4 130	4 336.5	1 475 ²⁾	29.5	-	7.375	0.17	100
500	4 130	4 336.5	2 950 ³⁾	-	29.50	14.750	0.34	100
600	4 300	4 515	2 150 ²⁾	43.0	-	10.750	0.24	100
600	6 020	6 321	2 150 ²⁾	43.0	-	10.750	0.17	100
600	6 020	6 321	4 300 ³⁾	-	43.00	21.500	0.34	100
700	5 800	6 090	2 900 ²⁾	58.0	-	14.500	0.24	100
700	8 120	8 526	2 900 ²⁾	58.0	-	14.500	0.17	100
700	8 120	8 526	5 800 ³⁾	-	58.00	29.000	0.34	100
800	7 600	7 980	3 800 ²⁾	76.0	-	19.000	0.24	100
800	10 640	11 172	3 800 ²⁾	76.0	-	19.000	0.17	100
800	10 640	11 172	7 600 ³⁾	-	76.00	38.000	0.34	100
900	10 000	10 500	5 000 ²⁾	100.0	-	25.000	0.24	100
900	14 000	14 700	5 000 ²⁾	100.0	-	25.000	0.17	100
900	14 000	14 700	10 000 ³⁾	-	100.00	50.000	0.34	100

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

DN	Q_s (m ³ /h)	Q_{max} (m ³ /h) (105 % of Q_s)	Q_p (m ³ /h)	Q_i (m ³ /h) (1:50 of Q_p) ⁴⁾	Q_i (m ³ /h) (1:100 of Q_p) ⁴⁾	Cut-off (m ³ /h)	Cut-off (% of Q_{max})	Typical pulse value ⁵⁾ (l/pulse)
1 000	12 000	12 600	6 000 ²⁾	120.0	-	30.000	0.24	100
1 000	16 800	17 640	6 000 ²⁾	120.0	-	30.000	0.17	100
1 000	16 800	17 640	12 000 ³⁾	-	120.00	60.000	0.34	100
1 200	18 000	18 900	9 000 ²⁾	180.0	-	45.000	0.24	100
1 200	25 200	26 460	9 000 ²⁾	180.0	-	45.000	0.17	100
1 200	25 200	26 460	18 000 ³⁾	-	180.00	90.000	0.34	100

Dynamic range $Q_i:Q_p$: better than 1:100 or 1:50 according to OIML R 75 class 2 and MID EN 1434 class 2.

Q_i (Q_{min}) means the minimal and Q_p (Q_{nom}) the nominal flow rate according to the approval requirements. Q_s is the highest operatable flow rate. The maximum flow rate (Q_{max}) is 105 % of Q_s . The low flow cut-off is 50 % of Q_i . Q_i , Q_p and Q_s are shown on the system nameplate of the FUE380.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s , two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow according to the approval requirements.

- 1) Typical pulse values with a pulse length of 5 ms in connection with SITRANS FUE950. Other values are possible, please see the selections at the 7ME341 Order code.
- 2) EN 1434 and MID flow values
- 3) OIML R 75 and MID flow values
- 4) The minimum flow (Q_i) should be checked in the PIA-selector or product master data base (PMD)
- 5) To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms: $L/pulse > Q_s$ (m³/h) / 360.
For example $Q_s = 300$ m³/h; $L/pulse > 300/360$; $L/pulse > 0.83$; therefore the pulse value must be 1 l/pulse

Technical specifications

Pipe design	2-path sensor with flanges and inline transducers wet-calibrated from factory
Nominal size welded version (DN 50 ... DN 80 in bronze)	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1 flanges: • type 01: DN 100 to DN 125 • type 11: DN 150 to DN 1200 • type 11 'design': DN 50 to DN 80
Pipe material	• DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. • DN 50 ... DN 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN 1982)
Transducer design	• DN 100 ... DN 1200: Inline version and welded onto the pipe • DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn ₃₆ Pb ₂ As)
Sensor operating conditions	
Ambient temperature	
• Operation	-10 ... +60 °C (14 ... 140 °F) (MID version: -10 ... +55 °C (14 ... 131 °F))
• Storage	-40 ... +85 °C (-40 ... +185 °F)
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTÜV information sheet 1466 and AGFW information sheet FW 510.
Media/surface temperature	
• DN 100 ... DN 1200	Remote: 2 ... 200 °C (35.6 ... 392 °F) MID: min. +15 °C/+59 °F
• DN 50 ... DN 80	Remote: 2 ... 150 °C (35.6 ... 302 °F) MID: min. +15 °C/+59 °F
• DN 50 ... DN 1200	Compact: 2 ... 120 °C (35.6 ... 248 °F) MID: min. +15 °C/+59 °F
Degree of protection	Sensor connection IP67/NEMA 4X/6
Electromagnetic compatibility	
• Emitted interference	To EN 55011/CISPR-11
• Noise immunity	To EN/IEC 61326-1 (Industry)
• MID	Environment class E2 and M1
Max. flow velocity at Q _s	DN 50 ... DN 1200: 9 m/s (29.5 ft/s)

Transmitter

The transmitter related to this system is the SITRANS FUE080.

Technical specifications to the FUE080 see page 3/251 ff.

Sensor cable	
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
Certificates and approvals	
Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according EN 10204-3.1 is optionally available

Calibration report	A standard calibration report is shipped with every flowmeter. Extended accredited ISO/IEC 17025 calibration certificates optionally available
Approvals	<ul style="list-style-type: none"> Approval standards: EN 1434 and OIML R 75 Class 2 Type approval: MID, MI-004, class 2 approval and certification (according to EN 1434)

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

Type-dependent settings

Flow value	Predefined according to EN 1434/OIML R 75/MID
Approval	Country specific
Flow rate v _f	0.02 ... 9 m/s (0.065 ... 29.5 ft/s)
Output A	Preset: Forward pulses
Output B	Preset: Alarm
Pulse value A & B (depending on DN value)	Preset: See scheme - previous page Preset for SITRANS FUE950 or free selectable depending on flow rate (Q _s)
Pulse width	Preset: 5 ms
Flow unit setup	Preset: m ³ /h
Volume unit setup	Preset: m ³

Flowmeter Calibration and traceability

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability). Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

A standard calibration certificate with Q_n as selected flow is shipped with each SITRANS FUE380. This production calibration protocol consists of 2 x 3 points at Q_i, 10 % Q_p and Q_p (max. 4 200 m³/h).

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

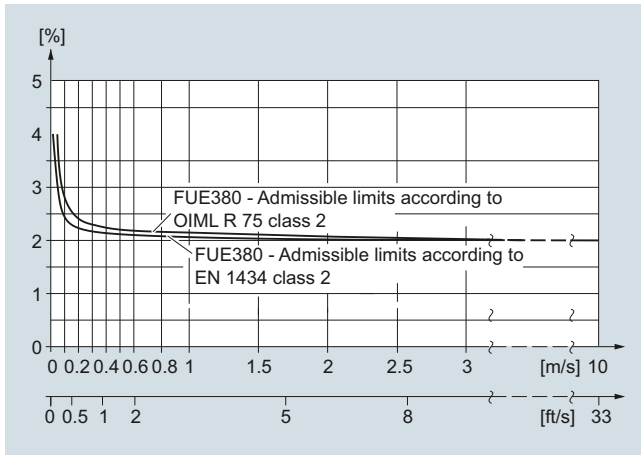
Typical accuracy SITRANS FUE380:

$$\pm(0.5 + 0.02 Q_p/Q) [\%]$$

Q_p according to EN 1434/OIML requirements.



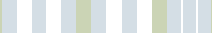
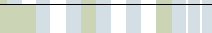


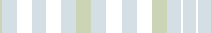

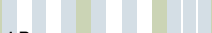

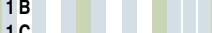

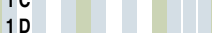

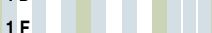



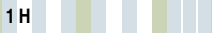

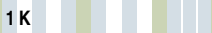

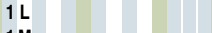

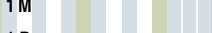



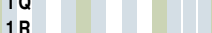



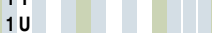

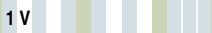

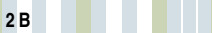

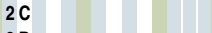

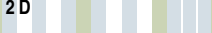


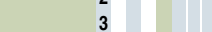
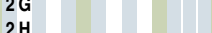

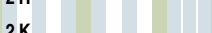

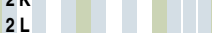



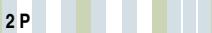
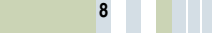


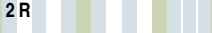

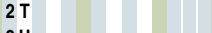
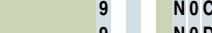
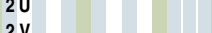
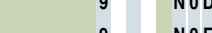
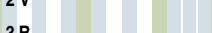
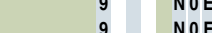
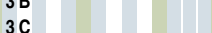


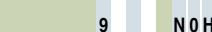
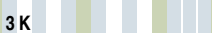

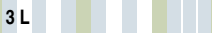

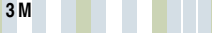

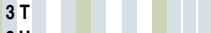
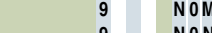

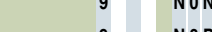


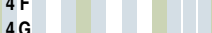

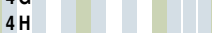
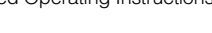
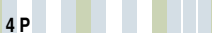

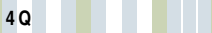

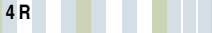



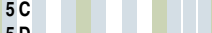

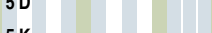

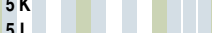

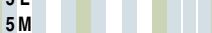





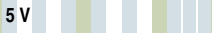

Example: DN 100, $Q_p = 60 \text{ m}^3/\text{h}$ at $Q = 1.2 \text{ m}^3/\text{h}$:

Accuracy at $1.2 \text{ m}^3/\text{h} = \text{typical } 1.5 \%$



SITRANS FUE380 fulfils the requirements

$E_f = \pm (2 + 0.02 Q_p/Q_i) \text{ max. } \pm 5 \%$, according to EN 1434 and OIML R 75, class 2 or MID class 2 requirements.

Selection and Ordering data			Article No.	Order code	Selection and Ordering data			Article No.	Order code
Flowmeter SITRANS FUE380 (type-approved)			7ME3410-		Flowmeter SITRANS FUE380 (type-approved)			7ME3410-	
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

Selection and Ordering data	Article No.	Order code
Flowmeter SITRANS FUE380 (type-approved)	7ME3410-	
Transmitter SITRANS FUE080		
IP67/NEMA 4X/6 115 ... 230 V AC	B	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack ⁶⁾	D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup ⁶⁾	E	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)	G	
Country/approval type⁷⁾		
Neutral, no approval mark	A	
China	C	
Russia, EN 1434/OIML R 75	M	
MID-Approval, (EN 1434/OIML R 75), English	R	
MID-Approval, (EN 1434/OIML R 75), German	S	
MID-Approval, (EN 1434/OIML R 75), Polish	T	
MID-Approval, (EN 1434/OIML R 75), French	U	
Pulse width setup		
5 ms (standard)	2	
10 ms	3	
20 ms	4	
50 ms	5	
100 ms	6	
200 ms	7	
500 ms	8	

¹⁾ Q_p (Q_n) is the normal flow according to the approval requirements. Q_p and Q_s is shown on the system label.

²⁾ Pipe material bronze brass

³⁾ EN 1434 flow values. The minimum flow (Q_i) should be checked in the PIA-selector or product master data base (PMD).

⁴⁾ OIML R 75/EN1434 flow values without PTB approval

⁵⁾ PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes

⁶⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

⁷⁾ Other countries in progress

⁸⁾ To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms:
 $L/pulse > Q_s (m^3/h) / 360$
 For example $Q_s = 300 m^3/h$; $L/pulse > 300/360$; $L/pulse > 0.83$; therefore the pulse value must be 1 l/pulse

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Article No. and following add-on code(s) with plain text.	
Calibration/certificate FUE380	
Approval, verification and approval sealing as defined with the article number. See Order code.	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter. Incl. Calibration protocol: 2 x 3 points, Q_i , 10 % Q_p and Q_p (max. 8000 m ³ /h).	Included
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 25 %, 50 % and 100 % of Q_p (max. 630 m ³ /h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN 250 ... DN 600 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 25 %, 50 % and 100 % of Q_p (max. 2800 m ³ /h).	D21
Accredited Siemens ISO/IEC 17025 calibration, DN 500 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 25 %, 50 % and 100 % of Q_p (max. 8000 m ³ /h).	D22
Output B as reverse flow pulses. No calibration/verification of this function.	E21
Material certificate	
EN 10204-3.1 (pipe material)	F10
Tag name plate	
Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).	Y17

Flowmeter SITRANS FUE380 operating instructions, accessories and spare parts

Operating instructions

Description	Article No.
• English	A5E00730100
• German	A5E00740611
• Spanish	A5E00754188
• French	A5E00754173

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

For accessories and spare parts on page 3/254 see chapter of transmitter FUS080/FUE080.

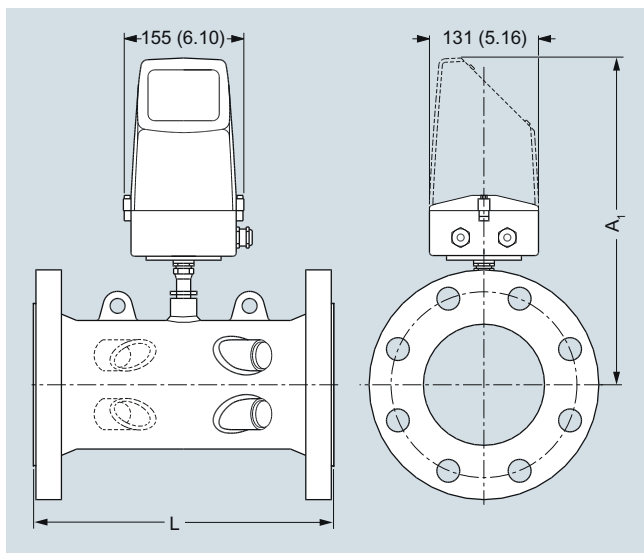


Please use online Product selector to get latest updates.

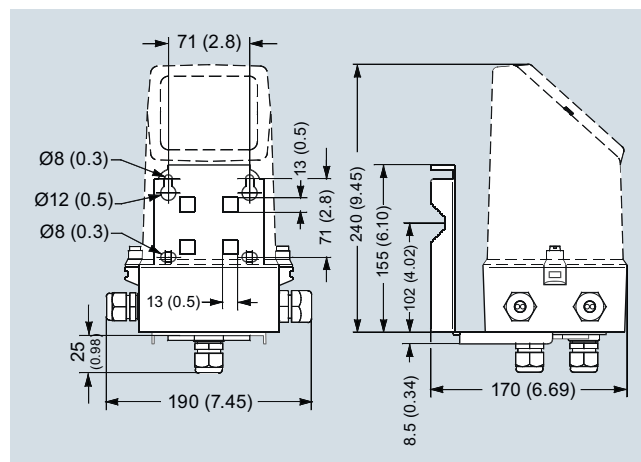
Product selector link:

www.pia-selector.automation.siemens.com

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



Dimensions in mm (inch)

Sensor dimensions for FUS380 and FUE380

Size DN	PN 16		PN 25		PN 40		A1 mm	Lift hug
	L mm	Weight kg	L mm	Weight kg	L mm	Weight kg		
50	-	-	-	-	300 +0/-2	10	350	No
65	-	-	-	-	300 +0/-2	15	360	No
80	-	-	-	-	350 +0/-3	18	370	No
100	350 +0/-2	15	-	-	350 +0/-3	18	375	No
125	350 +0/-2	18	-	-	350 +0/-3	24	380	No
150	500 +0/-3	28	-	-	500 +0/-3	34	390	No
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	414	No
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	440	No
300	500 +0/-3	66	500 +0/-3	81	-	-	466	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	495	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	507	Yes
500	625 +0/-3	194	625 +0/-3	231	-	-	558	Yes
600	750 +0/-3	303	750 +0/-3	365	-	-	609	Yes
700	875 +0/-3	361	875 +0/-3	553	-	-	660	Yes
800	1000 +0/-3	494	1000 +0/-3	770	-	-	710	Yes
900	1230 +6/-6	475	1300 +6/-6	835	-	-	760	Yes
1000	1300 +6/-6	594	1370 +6/-6	1000	-	-	810	Yes
1200	1360 +6/-6	732	-	-	-	-	910	Yes

Notes:

- Weight for transmitter/electronics 1.5 kg (compact version) or approximately 5 kg (remote version including 10 m cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 and FUE380

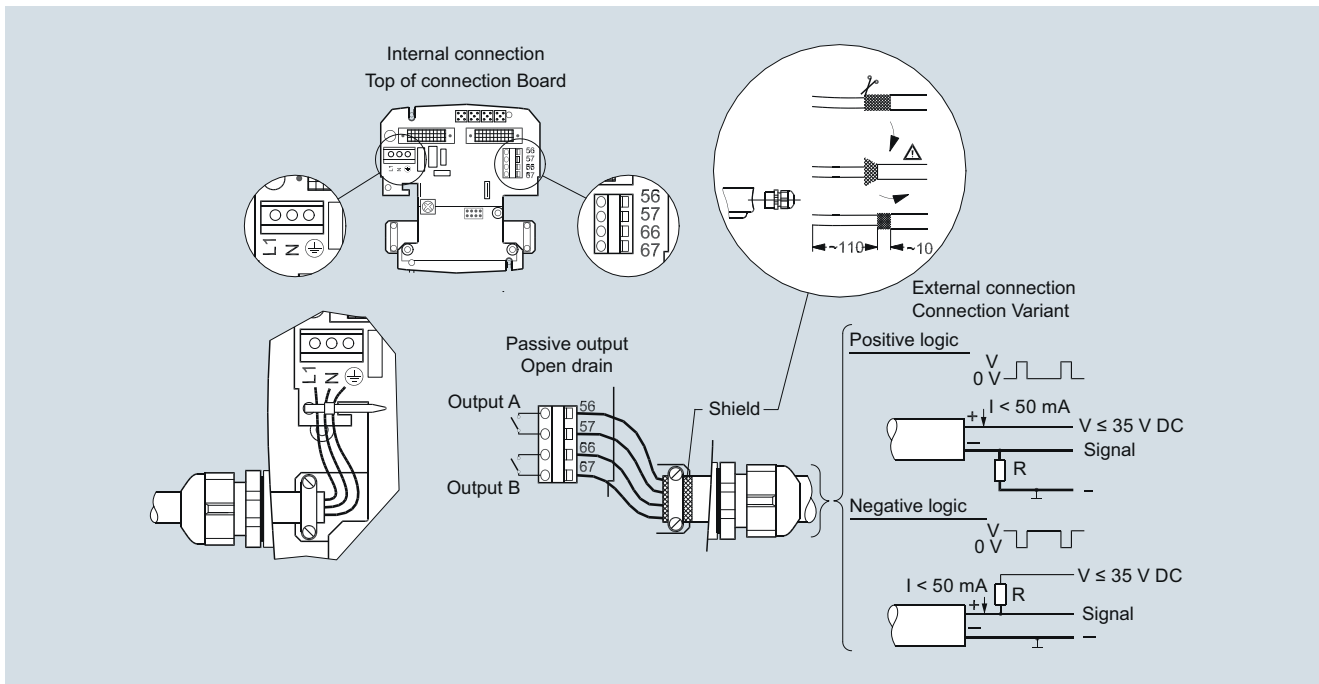
Size inch	PN 16		PN 25		PN 40		A1 inch	Lift hug
	L inch	Weight lb	L inch	Weight lb	L inch	Weight lb		
2	-	-	-	-	11.81 +0/-0.08	22	13.78	No
2½	-	-	-	-	11.81 +0/-0.08	33	14.17	No
3	-	-	-	-	13.78 +0/-0.08	40	14.57	No
4	13.78 +0/-0.08	33	-	-	13.78 +0/-0.12	40	14.76	No
5	13.78 +0/-0.08	40	-	-	13.78 +0/-0.12	53	14.96	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.35	No
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	No
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	No
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	18.35	Yes
14	21.65 +0/-0.12	207	21.65 +0/-0.12	267	-	-	19.49	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	Yes
20	24.61 +0/-0.12	428	24.61 +0/-0.12	509	-	-	21.97	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	23.98	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1246	-	-	25.98	Yes
32	39.37 +0/-0.12	1089	39.37 +0/-0.12	1698	-	-	27.95	Yes
36	48.43 +0/-0.24	1047	51.18 +0/-0.24	1841	-	-	29.92	Yes
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2205	-	-	31.89	Yes
48	53.54 +0/-0.24	1614	-	-	-	-	35.83	Yes

Notes:

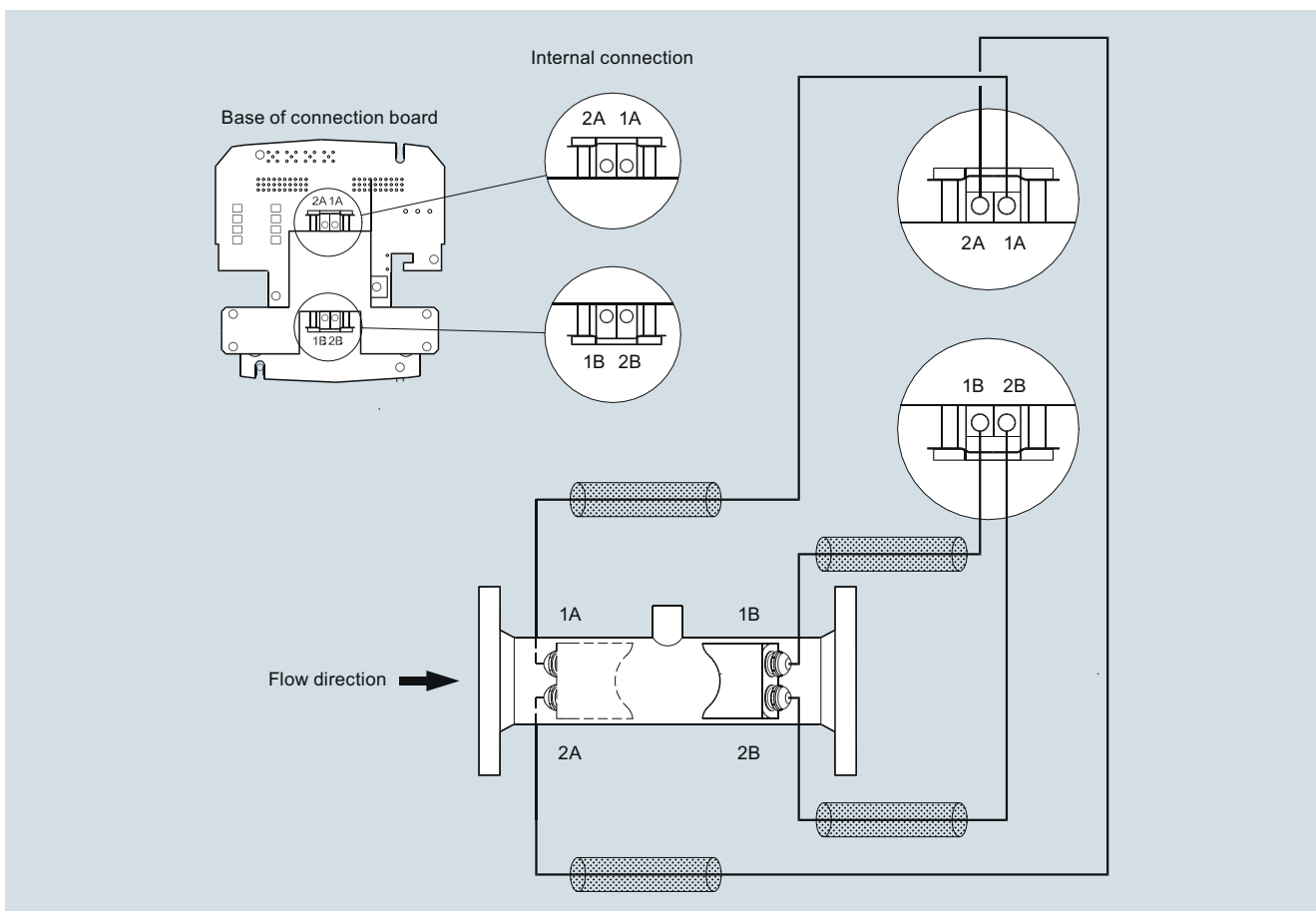
- Weight for transmitter/electronics 3.3 lb (compact version) or approximately 11 lb (remote version including 32.8 ft cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Schematics

3



Electrical connection of transmitter SITRANS FUS/FUE380



Electrical connection of sensor SITRANS FUS/FUE380

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

Overview



SITRANS FUE950 is a universal thermal energy calculator, which meets the requirements EN 1434 and has the MID and PTB K7.2 approval for energy metering with the media water.

SITRANS FUE950 has been developed for the SITRANS FUS380/ FUE380 and alternatively MAG 5000/6000 or FST020. SITRANS FUE950 is modular in construction and can by order be fitted with optional modules depending on the application. The FUE950 supports none of the SITRANS FX, FC products and only some of the FUS clamp-on products.

Benefits

Basic functions

- Prepared for heating, cooling measurement
- Approval for MID for heat metering and PTB K7.2 for cooling
- High-accuracy thermal energy metering, meets EN1434 requirements
- Measured temperature range -20 ... +190 °C (-4 ... +374 °F)
- Instantaneous values for energy/volume flow
- Battery or mains powered
- Battery version with battery lifetime of typically up to 10 years
- Optical data interface
- Real date and time
- Auto-detection of 2-wire or 4-wire temperature sensors

Additional functions

- Individual tariff functions
- Advanced functions for cooling/heating applications or the combination
- Memory for 24 periods (months, weeks, days)
- Data logger function
- Expandable functionality with 2 optional plug and play add-on modules
- Communication over M-Bus, RS 485 or RS 232

Add-on modules

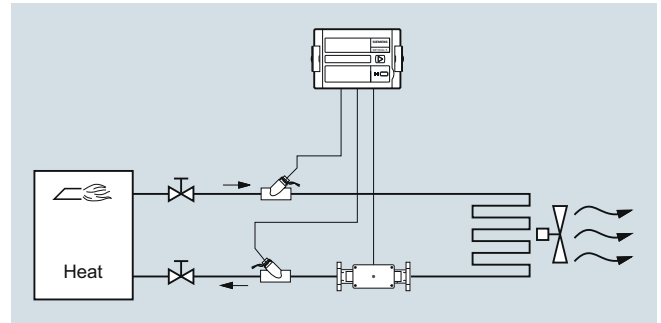
- Plug-in module with 2 extra pulse inputs
- Plug-in module with 2 pulse outputs
- Plug-in module with combination of input and output pulses
- Plug-in module for M-Bus communication
- Plug-in module for RS 232 or RS 485 communication
- Plug-in module with 2 passive current outputs (4 ... 20 mA)

Application

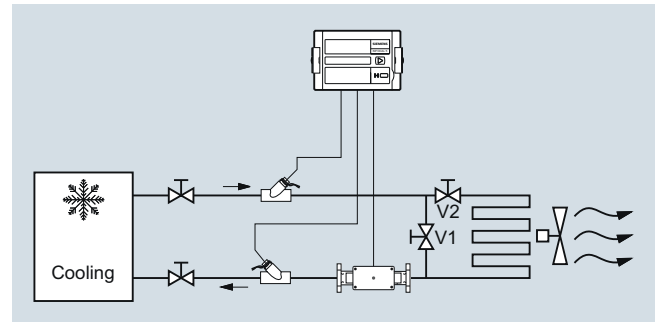
The SITRANS FUE950 is able to handle 3 kinds of applications, means energy calculation in:

- District heating applications
- Chilled water applications
- Combined cooling/heating applications

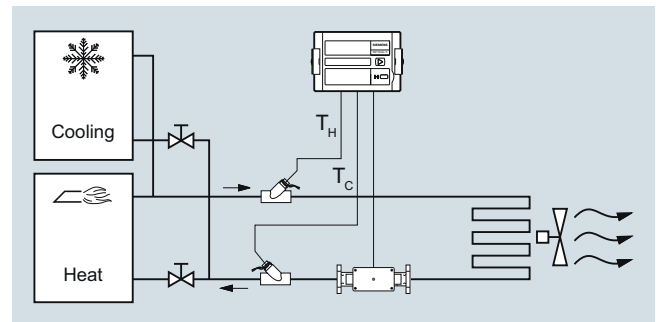
Energy metering in heating, hot water applications (code "A" and "B")



Energy metering in cooling, chilled water applications (code "C" and "D")



Energy metering in combined cooling/heating applications (code "E" and "F")



Design

SITRANS FUE950 has an easy-read 8-digit LCD display with associated pictograms for the various functions. As the display has been made for several applications, some figures/symbols not used for normal district heating applications will be shown.

SITRANS FUE950 has a push button for simple operation and provides user-friendly control via the various display menu loops. The display will always be configured for the application chosen, and for the selected display settings.

The integrator has an IP54 plastic housing and is designed for wall or panel mounting. The housing comes with prepared rubber gaskets cable entries for fast and easy installation.

Operation menu loop structure

The FUE950 display has six menu loops and the menus are numbered in the display from 1 to 6. Some display menus consist of two values (to maximum seven) that are shown alternately at 4-second intervals.

The main menu loop no. 1 with the current data, e.g. for energy, volume, flow rate and temperature, is preprogrammed as default setting.

In the combined heating/cooling configuration the menu loop no. 5 (tariff menu loop) will be activated additionally.

Display and output pulses

Units: MWh, GJ, Gcal, MBtu, m³, gal, m³/h, GPM, °C, °F and kW; all decimal points are statically (the unit "gal" is shown with factor x 100).

The display unit and the last fractional digit are typical used for the pulse outputs.

Function

Technical principle

Calculation of energy is based on the following formula:

$$\text{Energy} = \text{Volume} \times (T_{\text{Hot}} - T_{\text{Cold}}) \times K_{\text{factor}} (T_i)$$

Volume: Volume [m³] of a given amount of volume pulses

T_{Hot}: Measured temperature in the hot line

T_{Cold}: Measured temperature in the cold line

K_{factor} (T_i): Thermal coefficient of media enthalpy and heat content

The energy calculation is made by a counter and depends on temperature difference, pulse input frequency and legal requirements.

The calculator always carries out at least one energy calculation every 2 seconds. If the connected flowmeter has not sent enough pulses the energy calculation and flow indication is also based on the 8 seconds value.

Data memory

The FUE950 has a history memory of 24 periods (months, weeks, days). The following values are stored monthly, weekly or daily in the EEPROM on the programmed day of 1...31 (via software tool).

• Date/Time	• Volume
• Energy	• Error day counter
• Tariff energy 1	• Maximum monthly flow rate
• Tariff energy 2	• Maximum monthly power
• Tariff definition 1	• Date of maximum monthly flow rate
• Tariff definition 2	• Date of maximum monthly power
• Pulse counter input 1	• Pulse counter input 2
• Operation hours	

Data logger memory (LOG)

The LOG of the calculator is stored every 24 hours with all cumulative values in the EEPROM. The storage frequency can be selected from various storage intervals (5, 6, 10, 12, 15, 20, 30, 60 minutes or the default setting of 24 hours). The data which are stored in the LOG could be read out using a software tool and can be used for evaluations.

Extract of possible LOG settings

Storage interval	Values	Number of data records	Recording period
5 minutes	• Error status	440	36.6 hours
15 minutes	• Overload time temperature	440	110 hours
1 hour	• Overload time flow rate	440	18.3 days
24 hours (default setting)	• Forward temperature • Return temperature • Date and time • Energy • Tariff energy 1 • Tariff energy 2 • Tariff definition 1 • Tariff definition 2 • Volume • Error day counter	440	440 days

Maximal Values

The integrator creates max. values for power and flow rate based on consumption time, which are stored in the EEPROM. The integration intervals are adjustable to 6, 15, 30 or 60 minutes and 24h. Default setting is 60 minutes.

Tariff/Accounting date function

The calculator includes two independent memories in which the accumulated energy at two programmable tariff dates are stored.

- Last accounting date
- Last but one accounting date

Values stored

- Energy
- Volume
- Tariff counter 1
- Tariff counter 2
- Pulse counter 1
- Pulse counter 2
- Date

The integrator offers two optional tariff memories for monitoring plant load states. Here it concerns threshold value tariffs. Extensive tariff conditions make it possible to adapt the calculator individually to the required customer-specific applications.

Both tariffs are separately configurable and independent from each other. Energy or time can be measured alternatively per tariff register dependent on the tariff mode adjusted in each case.

With the "time triggered tariff function" the switch-on time and the switch-off time are adjustable independent from each other for each day of the week in steps of 15 minutes.

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

The following tariff limit types of the tariff function are possible: (This example applies to the display at 1 fractional digits after comma)

Type	Description	Limit	Limit resolution
dT	Temperature difference	1 ... 190 °C	1 °C
-dT	Negative temperature difference	1 ... 190 °C	1 °C
TR	Return temperature (low)	1 ... 190 °C	1 °C
TV	Forward temperature (high)	1 ... 190 °C	1 °C
P	Power	10 ... 2 500 kW	10 kW
Q	Flow	1 ... 255 m ³ /h	1 m ³ /h
FE	"Theoretically forward energy" with return temperature of 0 °C		
Z	"Time triggered" counting energy		
E	"External" counting energy		

Error handling and memory

Events such as changes and faults are stored in a non-volatile memory with a capacity of up to 127 entries. The following events are recorded:

- Checksum error
- Temperature measurement error
- Error hours
- Start and end of test mode

If SITRANS FUE950 records an error, this will be automatically indicated by a "alarm symbol" on the display.

To protect the reading data, all the relevant data are saved in a non-volatile memory (EEPROM). This memory saves the measured values, device parameters and types of error at regular intervals.

The following events are recorded:

- Temperature sensor error
- Swapped hot and cold temperature sensors
- Battery low warning
- Power supply failure
- Optical communication warning
- RAM checksum error

Outputs/Inputs/Communication

Communication interfaces:

SITRANS FUE950 is fitted with an optical infra-red send/receive port in accordance with EN1434/IEC 61107, protocol standard, EN 1434/EN 60870-3 (M-Bus protocol).

A specific optical head with a permanent magnet (IrDA-adapter) in accordance with EN 1434 can be used for readout data or communication with the parameterization software.

2 ports for optionally plug-in modules

The calculator features 2 ports for the plug-in modules.

One slot is for the function modules and the other for the communication modules.

Communication modules

The following communication modules are available as options: RS 232 module, RS 485 module and M-Bus module. The RS 232 and RS 485 communication modules are serial interfaces and permit data exchange with the calculator. For this purpose a special data cable is necessary.

The M-Bus module is a serial interface for communication with external devices (M-Bus Master/Centre). According to the M-Bus structure a number of calculators can be connected to a control centre.

Pulse input module

Two pulse inputs are available. The pulse value and the unit is configurable for energy, water, gas or electrical meter by parameterization software. Data are separate cumulated in different registers and are also stored on the two accounting day's (Tariff registers).

Combined Pulse Input/Output module

Two pulse inputs combined with one pulse output are available on one module. The pulse inputs are configurable with value and the unit by parameterization software.

The pulse output is also programmable using the parameterization software.

Pulse output

The calculator provides levels for two optional external pulse outputs, which can be freely programmed using the parameterization software tool.

Default setting is one pulse which occurs per change in the least significant digit in the display with the unit and resolution selected by the device ordering.

Possible pulse output values

- Energy (default setting)
- Volume (default setting)
- Tariff energy 1
- Tariff energy 2
- Tariff condition 1, limit switch
- Tariff condition 2, limit switch
- Energy error
- Volume error
- Volume with specific resolution (0.1, 1.0, 10 or 100)
- Energy with specific resolution (0.1, 1.0, 10 or 100)

Combined current output module

Optional module with 2 passive 4 ... 20 mA outputs.

Possible output values:

- Power (default setting for output #1)
- Flow (default setting for output #2)
- Hot, cold or difference temperature

The settings can be configured by parameterization software. The current output module occupies both ports, means no other plug-in module will possible to plug in.

Module combinations

The calculator has a group of extension modules for communication and another group of extension modules for additional functionality. These modules are available first selected within the calculator, or for retrofitting in the field.

One single function module as well as one single communication module out of following modules is selectable.

Function modules:

- Pulse input module, 2 inputs
- Pulse output module, 2 outputs
- Combined pulse module 2 inputs, 1 output
- Combined current output module, 2 x passive 4 ... 20 mA (occupies both ports)

Communication modules:

- M-Bus (M-Bus protocol according EN 1434-3)
- RS 232 (M-Bus protocol according EN 1434-3)
- RS 485 (M-Bus protocol according EN 1434-3)

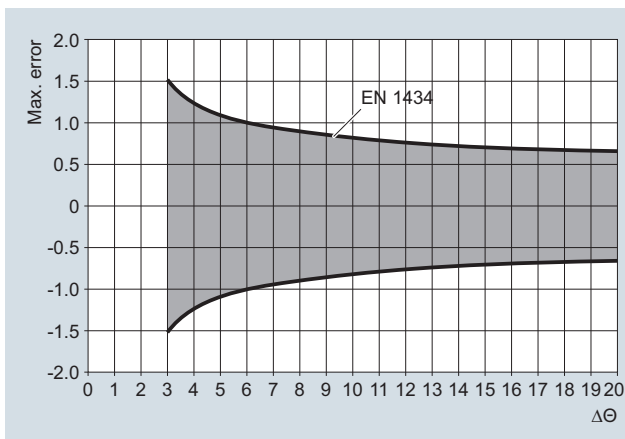
Integration

SITRANS FUE950 is a multi-purpose energy calculator for media water which meets the requirements of EN 1434. Further, the energy calculator has been specially developed to process volume pulses from SITRANS FUS380/FUE380 or alternatively MAG 5000/6000 or FST020 transmitter.

Technical specifications

Approval	MID approved in accordance with energy meter EN 1434 and PTB K7.2 (German national cooling approval)	
Approved temperature range		
• Heating	0 ... 180 °C (32 ... 356 °F)	
• Cooling	0 ... 105 °C (32 ... 221 °F)	
Absolute temperature range	-20 ... +190 °C (-4 ... -374 °F)	
Differential temperature		
• Heating	3 ... 177 K (starting at 0.1 K)	
• Cooling	3 ... 102 K	
Measuring accuracy	Meets requirements of EN 1434 Typically max. $\pm (0.5 + 3K/\Delta\Theta)$ [%] of measured value	
Measuring rates		
• Battery type D-cell	Volume: 1 s, temperature: 4 s	
• Mains versions	Volume: 1/8 s, temperature: 2 s	
Flow range	Depends on pulse input value (IN0), see "Selection and Ordering data".	
Power range value	Depends on pulse input value as follows:	
	Pulse input value (l/P or gal/P)	Max power [kW]
	1	15 000
	2.5	15 000
	5	15 000
	10	150 000
	25	150 000
	50	150 000
	100	1 500 000
	250 *)	1 500 000
	500 *)	1 500 000
	1 000 *)	15 000 000
	*) not available for gal/pulse	

Typical accuracy of FUE950



User interface (always included)

Display	8-digit LCD display with associated pictograms/symbols
Units	MWh, GJ, Gcal, MBtu, m ³ , m ³ /h, GPM, gal, °C, °F, kW, MBtu/h (gal is shown with factor x 100)
Totalizer value range	99 999 999 or 9 999 999.9 (0 and 1 digit after comma). Display digits: Flow in 6 digits; Volume, power and energy in 8 digits
Values	Power, energy, volume, flow rate, temperatures
Push button	Single push button for the menu controlling
Optical interface IrDA interface	ZVEI optical interface with M-Bus protocol as per EN 1434, connection via separate IrDA-adaptor baud rate: 300 or 2400

Rated operation conditions

Enclosure	IP54 in accordance with IEC 529
Material	
• Housing	C Lexan 141R (or similar); colors: light gray (top part) and black (bottom part)
• Pipe/wall fitting	PA 6.6 GF25 (or similar)
• Other plastic parts	ABS Cicolac GPM500 (or similar)
• Gaskets	Neoprene and rubber cable bushings: EPDM 50
• Rubber cable bushings	EPDM 50
Temperature	
• Ambient	5 ... 55 °C (41 ... 131 °F)
• Storage	-25 ... +70 °C (-13 ... +158 °F) Relative ambient humidity < 93 %
Environment class	
• Mechanic class	M1/M2
• Electromagnetic class	E1/E2 (MID) or C (DIN EN 1434)

Temperature input (always included)

Function	The temperature sensors must be connected to terminals 1-5 and 6-2 (TH) and 3-7 and 8-4 (TC) depending on cable type (2-wire or 4-wire).
Temperature range	-20 ... 190 °C (-4 ... 374 °F) for T _H and T _C
Absolute measuring range	Start 0.1 K, min. 3 K, max. 177 K
Temperature difference	0.125 K
Measurement cut-off	16-bit digital resolution AD converter
Display resolution	T _H and T _C : 0.1 K, ΔT : 0.1 K
Sensor types	Pt100 or Pt500 as 2-wire or 4-wire; Standard is Pt500. Sensor cable length: up to 10 m (according EN 1434 and MID-type approval).
Sensor connection	4-wire or 2-wire; auto detection of connection version

Flow input (IN0) (always included)

Function	Used as standard for flow input of the external flowmeter. The input is marked as 10 (+ Flow Pulse), 11 (- Gnd) on the terminal strip. Note: The pulse input value selection must be the same as the pulse output setting of the flowmeter.
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Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

Pulse value	1 ... 1 000 l/pulse or 1 ... 100 gal/pulse, selection by corresponding Order code. Will be shown at the device label	Possible pulse output selection	<ul style="list-style-type: none"> • Energy (default setting for 'Out1') • Volume (default setting for 'Out2') • Tariff energy 1 • Tariff energy 2 • Tariff condition 1 (limit switch) • Tariff condition 2 (limit switch) • Energy error • Volume error • Volume with specific display resolution (or with factor 0, 1, 10 or 100 thereof) • Energy with specific display resolution (or factor 0.1 thereof)
Pulse frequency	≤ 100 Hz (200 Hz)		
Pulse ON-time	≥ 3 ms		
Pulse OFF-time	≥ 2 ms		
Type	Active pulse input		
Terminal voltage	3.6 V DC (supplied internally by FUE950)		
Flowmeter installation place	The flowmeter installation place can be in the hot line or cold line ("forward or return pipe") selected by corresponding Order code. The "installation place" will be shown at the device display and nameplate		
Connected cable	Max. 10 m (shielded cables are highly recommended)		
Ports for option modules			
Type	The calculator features 2 ports for optional plug-in modules.		
Function modules (Port 1 or 2)	<ul style="list-style-type: none"> • Pulse input module, 2 inputs (In1, In2) • Pulse output module, 2 outputs (Out1, Out2) • Combination module of 2 inputs (In1, In2) and 1 output (Out1) 		
Current output module (Port 1)	2 passive 4 ... 20 mA (#1, #2) (occupies both port 1 and 2)		
Communication modules (Port 1 or 2)	M-Bus, RS 232 or RS 485 (M-Bus protocol, according EN 1434-3)		
Pulse output			
Function	The module contains connections for 2 pulse outputs, which can be programmed as desired using a software tool. The pulse outputs are marked as standard as O1, 'gnd' and O2, 'gnd' on the terminal strip and Out1 respectively Out2 in the display.		
Type	Passive "open collector" pulse output, outputs potential isolated to each other		
Pulse value	Last significant digits of the display (unit/pulse), selection by corresponding Order code and setting can be read via display menu, settings changeable via software tool		
Pulse output 1			
• Pulse frequency	≤ 4 Hz		
• Pulse width	125 ms ± 10 %		
• Pulse duration	125 ms ± 10 %		
• Pulse break	≥125 ms -10 %		
Pulse output 2			
• Pulse frequency	≤ 100 Hz, depending on the selected pulse length		
• Ratio	Pulse duration/pulse break ~1:1		
Pulse length	5, 10, 50, 100 ms (default: 5 ms)		
External voltage supply	3 ... 30 V DC		
Current	≤ 20 mA with a residual voltage of ≤ 0.5 V		
		Pulse input	
		Function	Add-on module for two additional counters. The pulse input 1 is marked as I1, 'gnd' and the input 2 as I2, 'gnd' on the terminal strip and indicated in the display as separate registers IN1 and IN2 and can also be transferred via the communication modules.
		Type	Passive "open collector" pulse inputs, outputs not potential isolated to each other, data are separate cumulated in different registers and are also stored on the two accounting day's.
		Pulse value	Pulse value and the unit are configurable for energy, water, gas or electrical meter by a software tool Default: Pulse input 0.1 m ³ or 1 gal (if unit 'gal' is ordered with the Z-option "L05")
		Pulse frequency	≤ 8 Hz
		Pulse length	≥ 10 ms
		External voltage supply	3 V DC (supplied internally by FUE950)
		Current	based on R _i = 2.2 MΩ
		Cable length	< 10 m connection limit
		Current output module	
		Function	The module contains connections for 2 passive current outputs, which can be programmed individually using the software tool. The outputs are marked „#1" and „#2" with corresponding polarity „+" and „-" on the terminal strip. The module will be connected on port 1 only, but both ports are occupied by the module.
		Terminal voltage	External supply: 10 ... 30 V DC (passive output)
		Signal range	4 ... 20 mA; 4 mA = 0 value and 20 mA = default maximum values (for #1: Power in kW and for #2: Flow with the max. values and selected unit). Defaults: For power it is the max. selectable value x 100 000 the last digit of display (e. g. 20 mA = 10 000 kW (1 digit res.) or 100 000 kW (0 digit res.). For flow it is the max. selectable value x 10 000 the last digit of display (e. g. 20 mA = 1 000.0 m ³ /h (1 digit res.) or 10 000 m ³ /h (0 digit res.).

Load	Max. 800 Ω
Upper limit	Up to 20.5 mA (exceed causes the error current value)
Signal on alarm	Errors are indicated with 3.5 mA or 22.6 mA (programmable, default: 3.5 mA)
Output values	Power, flow, temperature (configuring via software tool; default: for #1: Power and for #2: Flow)

M-Bus output	
Type	The optional M-Bus plug-in module is a serial interface for communication with external devices (M-Bus Repeater)
Protocol	M-Bus according EN 1434-3
Connection	The connection is not polarity-conscious and is electrically isolated, connection of 2 x max. 2.5 mm ² wires, 300 or 2400 baud (auto baud detection), current drawn: one M-Bus load. M-Bus address: Each port has its own primary M-Bus address (Prim1 = the last two digits of the serial number; Prim2 = 0). The secondary address is unique for each calculator and is factory-set to equal the serial number.

RS 232 output	
Type	The optional module RS 232 is a serial interface for data transmission with external devices, e.g. PC; baud rate: 300 or 2400. The module contains a 3-pole terminal strip with terminals marked 62 (TX), 63 (RX) and 64 (GND). For this purpose a special data cable is necessary.
Protocol	M-Bus according EN 1434-3
Connection	The module contains a 3-pole terminal strip with terminals marked 62, 63, 64 (max. 2.5 mm ²); Connected cable length: max 10 m; For communication with a PC a special adapter cable is required (Article No. A5E02611774).

RS 485 output	
Function	The optional RS 485 module is a serial interface for data transmission with external devices, e.g. PC; baud rate: 2400. The module contains a 4-pole terminal strip with terminals marked D+, D-, Vcc and GND.
Protocol	M-Bus protocol according EN 1434-3
Connection	Terminals D+ and D-; electrically isolated; 2400 baud only. An external supply of 12 V DC ± 5 V (<5 W) is needed for the module (terminals Vcc and GND). The module terminals are max. for 2.5 mm ² wires. Connected cable length: max. 10 m

Power consumption	
230 V and 24 V versions	Typical current appr. 0.15 VA
3.6 V D-cell battery	Typical battery lifetime 10 years under normal conditions (no add-on modules, max. 40 °C ambient temperature)
Supply data	Internal voltage 3.6 V by the battery or plug-in power supply module
Battery, 3.6 V type (option)	3.6 V lithium D-cell, battery lifetime typically 16 years with independently powered flowmeter
230 V AC module (option)	Plug-in module for 230 V AC (195 ... 253 V AC), 50/60 Hz (incl. battery backup)
24 V AC module (option)	Plug-in module for 24 V AC (12 ... 30 V AC) (incl. battery backup)
Battery backup (option)	Only with mains supply modules by internal 3.0 V lithium battery (type CR 2032) Displayed values, date and time are still updated, but the measuring functions have stopped, including the flow rate measurement. Communication via optional modules M-Bus, RS 485, RS 232 or optical interface is maintained, affecting the backup battery lifetime.

Accessories/Software

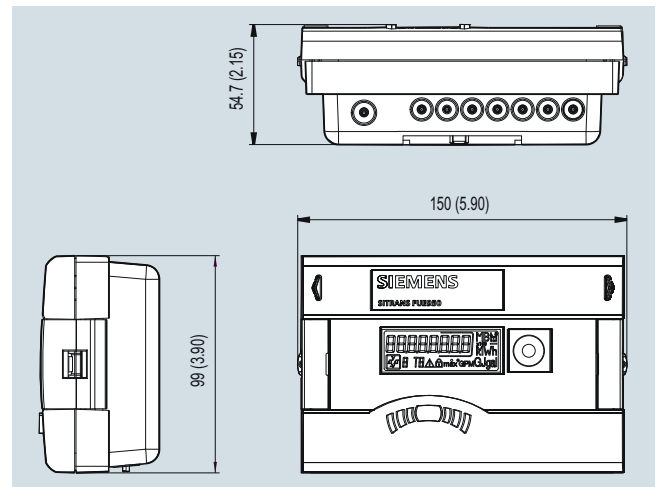
The parameterization software based on the M-Bus is a convenient tool for handling the calculator. It runs on Windows and is used for:

- Configuration of the calculator functionality, reading out different memories, printing out calculator logs (standard).
- Expert programming of the device (advanced setup).
- Test Lab programming of the device (full setup)

Configuration of the calculator functionality, reading out different memories, printing out calculator logs. For further details please contact your local Siemens representative.

A specific optical head with a permanent magnet in (IrDA adapter with bluetooth) accordance with EN 1434 can be used for programming/altering programming of readout data, configuration data, etc. The reader head can also be used to change measuring data.

Dimensional drawings

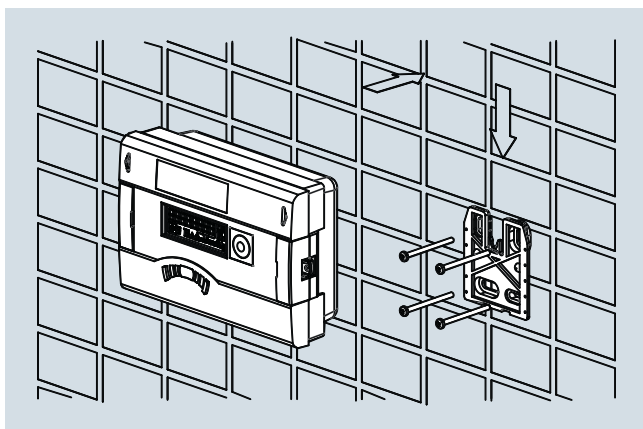


SITRANS FUE950, dimensions in mm (inch)

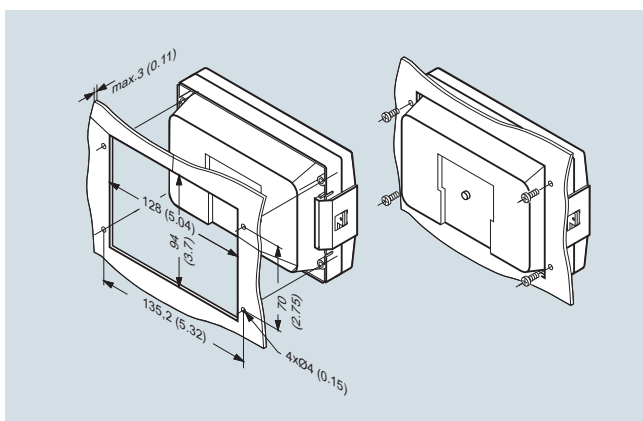
Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator



Wall mounting



Panel mounting, dimensions in mm (inch)

Pt500 temperature sensor pairs

Application

The temperature sensor set is designed for use with the Siemens energy calculator type SITRANS FUE950 for measurement of the energy consumption in a district heating or cooling net.

Temperature sensors are one of the integral components of every thermal energy meter in heating or cooling applications. They are used for determining temperature changes in fluids due to energy taken from or supplied to the loop. The temperature is thus measured by mounting temperature sensors upstream and downstream from the point where the exchange in the thermal energy of the system is.

To ensure an accurate measurement of the temperature difference according to MID (EN 1434) or PTB K7.2 the sensors are delivered as matched pairs.

By selection with the corresponding Order code the Pt500 sensor pair sets can be delivered with heating approval or with approvals for combined heating/cooling applications.

Technical specifications

Temperature sensor pairs:

2-wire Pt500

Pt500 2-wire temperature sensor pair (EN 1434)	
Measuring insert	Pt500 temperature sensor, EN 60751, tolerance class B, 2-wire
Pairing	Paired to EN 1434 (10 ... 130 °C/14 ... 266 °F)
Media temperature	0... 150 °C (32 ... 302 °F)
Response time $T_{0,5}$	See sensor pocket specifications
Medium	Typically heating water
Pressure rating	See sensor pocket specifications
Protection	IP65
Pipe material	AISI 304Ti/1.4303
Dimension	Ø 6 mm
Sensor tube length	50 mm
Cable length	Up to 10 m (32.8 ft), fixed connected silicon cable, 2 connection wire terminals, terminal sleeves to DIN 46228

4-wire Pt500

Pt500 4-wire temperature sensor pair (with MID and PTB K7.2 approval)	
Measuring insert	Pt500 temperature sensor, EN 60751, tolerance class to ISO 751 Class B; 4-wire
Pairing	Matched paired according to EN 1434 at 10, 75 and 140 °C (50, 167 and 284 °F)
Type approval	MID (DE-06-MI004-PTB011) and PTB K7.2 (PTB 22.77/09.01). Only to be mounted with related sensor pockets according to the type approvals.
Media temperature	0... 150 °C (32 ... 302 °F)
Permissible temp. pair range for ΔT	<ul style="list-style-type: none"> • Heating 3 ... 150 K • Cooling 3 ... 85 K
Medium	Approved for heating/cooling water
Protection	IP65
Environment	<ul style="list-style-type: none"> • Mechanic class M3 • Electromagnetic class E1 (MID)
Pressure rating	See sensor pocket specifications
Material	<ul style="list-style-type: none"> • Protective tube Stainless steel AISI 304Ti/1.4571 (or similar), diameter of protective tube: 6 mm • Connector cable Silicon cable, 4 connection wire terminals, terminal sleeves to DIN 46228
Sensor tube length	140 or 230 mm (5.51 or 9.06 inch)
Cable length	5 m (16.4 ft), fixed connected

Sensor pockets

Stainless steel sensor pocket (for 4-wire Pt500 types only - standard)

Media temperature	0 ... 150 °C (32 ... 302 °F)
Approval	Approved only together with 4-wire sensors
Medium	Approved for heating/cooling water; up to max. 5 m/s flow velocity
Pressure rating	PN 40
Length	Face-to-face length 120/135 and 210/225 mm (4.72"/5.23" and 8.27"/8.86")
External diameter	Protective tube 8/11 mm (0.32"/0.43")
Internal diameter	Protective tube 6 mm (0.24")
Pipe connection	Thread G 1/2" (with sealing screw for sensor)
Material	Protective tube AISI 316Ti/1.4571 (or similar)
Use	<ul style="list-style-type: none"> Use with related 4-wire Pt500 sensors only (according type approval) For flow velocities up to 5 m/s Recommended to install with welded sleeve (according to EU standard)

Stainless steel sensor pocket (for 2-wire Pt500 types only - some only available as spare part)

Media temperature	0 ... 180 °C (32 ... 356 °F)				
Medium	Approved for heating water				
Response time $T_{0.5}$	Typically 13 s at 0.4 m/s with pasta Typically 5 s at 0.4 m/s without pasta				
Pressure rating	PN 25				
Length	L1 (mm)	92	127	168	223
	L (mm)	82	117	155	210
Material	Stainless steel: AISI 316Ti/1.4571				
Use	For 2-wire Pt500 types only				

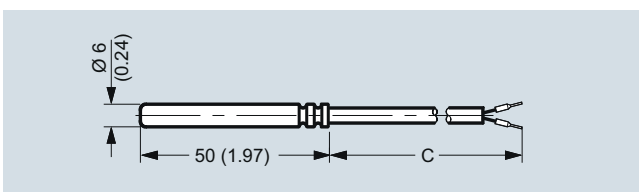
Brass sensor pocket (for 2-wire Pt500 types only - some only available as spare part)

Media temperature	0 ... 150 °C (32 ... 302 °F)			
Medium	Approved for heating water			
Response time $T_{0.5}$	Typically 9 s at 0.4 m/s with pasta Typically 5 s at 0.4 m/s without pasta			
Pressure rating	PN 16			
Length	L1 (mm)	47	92	127
	L (mm)	40	82	117
Material	Brass: CuZn ₄₀ Pb ₂ (Ms58)			
Use	For 2-wire Pt500 types only			

Dimensional drawings

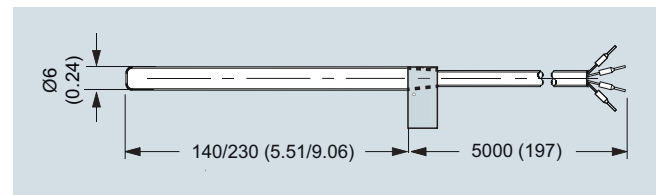
Pt500 2-wire temperature sensor pair (EN 1434)

Cable length 2, 3, 5 or 10 m ('C' at the dimensional drawing)



Pt500 2-wire temperature sensor, dimensions in mm (inch)

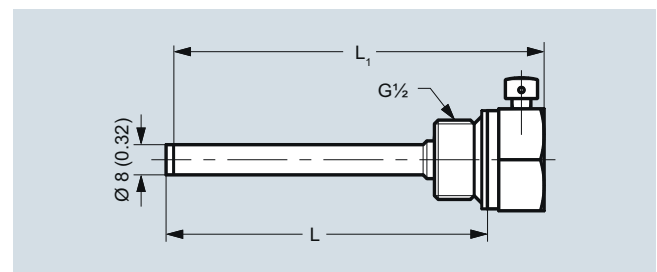
Pt500 4-wire temperature sensor pair (with MID and PTB K7.2 approval)



Pt500 4-wire temperature sensor, dimensions in mm (inch)

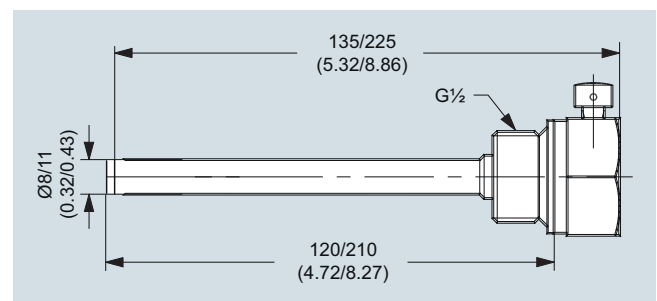
Stainless steel sensor pocket (for 2-wire Pt500 types only)

Length	L1 (mm)	92	127	168	223
	L (mm)	82	117	155	210



Sensor pocket (for 2-wire Pt500 types only), stainless steel, dimensions in mm (inch)

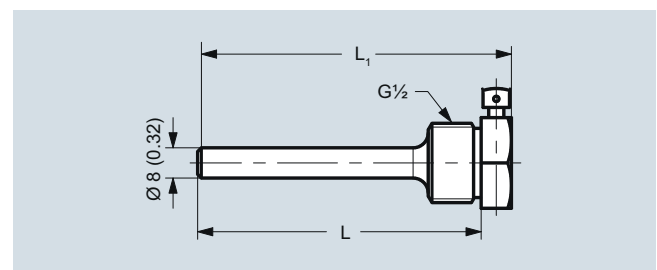
Stainless steel sensor pocket (for 4-wire Pt500 types only)



Stainless steel sensor pocket, dimensions in mm (inch)

Brass sensor pocket (for 2-wire Pt500 types only)

Length	L1 (mm)	47	92	127
	L (mm)	40	82	117



Sensor pocket, brass (for 2-wire Pt500 types only), dimensions in mm (inch)

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

Selection and Ordering data

Article No.

Order code

Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved

7ME3480 - - - - -

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Flow input setting (IN0)

The pulse input value selection must be the same as the pulse output setting of the selected flowmeter. To get optimal function and performance the pulse value must be selected as low as possible according to the maximum flow rate.

The following calculation formula can be used for determining the lowest pulse value at a pulse length of 5 ms: $L/\text{pulse} > Q_{\text{max}} (\text{m}^3/\text{h})/360$.

For example $Q_{\text{max}} = 300 \text{ m}^3/\text{h}$; $L/\text{pulse} > 300/360$; $L/\text{pulse} > 0.83$; therefore the pulse value must be 1 l/pulse.

Pulse input in l/pulse or in gal/pulse (with option L05)	Flow limit Q_{max} in m^3/h	Flow limit Q_{max} in GPM *) (with option L05)
1	360	6 000
2.5	900	15 000
5	1 800	30 000
10	3 600	60 000
25	9 000	150 000
50	18 000	300 000
100	36 000	600 000
250	90 000	-
500	180 000	-
1 000	360 000	-

*) GPM = Gallons per minute

2 A
2 B
2 C
3 A
3 B
3 C
4 A
4 B
4 C
5 A

Calculator application/Flowmeter installation place

For heating, flowmeter in return pipe (cold pipe), typical standard

For heating, flowmeter in forward pipe (hot pipe)

For cooling, media water, flowmeter in forward pipe (cold pipe)

For cooling, media water, flowmeter in return pipe (hot pipe)

For combined cooling/heating, flowmeter in forward pipe (hot pipe as heating) (MID conformity declaration for heating)

For combined cooling/heating, flowmeter in return pipe (cold pipe as heating) (MID conformity declaration for heating)

Temperature sensor type

Pt500 setup, no sensor pair included (standard)

Pt500 setup and Pt500 sensor pair (6/140 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 140 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01, incl. factory test report (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).

Pt500 setup and Pt500 sensor pair (6/230 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 230 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01, incl. factory test report (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).

Pt100 setup, no sensor pair included

Pt 500 setup and PT500 sensor pair (6/50 mm), 2-wire type incl. 5 m cable, 6 mm sensor diameter and 50 mm length, with MID approval (only for use with the applicable temperature sensor pockets)

Pt 500 setup and PT500 sensor pair (6/50 mm), 2-wire type incl. 10 m cable, 6 mm sensor diameter and 50 mm length, with MID approval (only for use with the applicable temperature sensor pockets)

Temperature sensor pocket sets: (for 6 mm sensor diameter)

No pockets (standard)

Brass pockets for 6 mm 2-wire sensors, length 82/92 mm, G½ inch, max. PN 16 (2 pcs.)

Stainless steel pocket, 120/135 mm length for 6 mm sensor diameter, max. PN 40 and max. 5 m/s (2 pcs. for 140 mm 4-wire sensors above)

Stainless steel pockets for 6 mm 2-wire sensors, length 117/127 mm, G½ inch, max. PN 25 (2 pcs.)

Stainless steel pocket, 210/225 mm length for 6 mm sensor diameter, max. PN 40 and max 5 m/s (2 pcs. for 230 mm 4-wire sensors above)

Stainless steel pockets for 6 mm 2-wire sensors, length 155/168 mm, G½ inch, max. PN 25 (2 pcs.)

Voltage supply

Battery 3.6 V DC (Lithium D-cell type) (standard)

Mains power module for 230 V AC supply (incl. back-up battery)

Mains power module for 24 V AC supply (incl. back-up battery)

No power supply module (power supply ordering separate)

A
B
C
D
E
F

0
3
4
5
6
7

0
2
5
6
7
8

1
2
3
4

Selection and Ordering data	Article No.	Order code
Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved	7ME3480 -	
Option modules		
No module (standard)		A
<u>1 module (communication module)</u>		
M-Bus module		B
RS 232 module (M-Bus protocol)		C
RS 485 module (M-Bus protocol)		D
<u>1 module (function module)</u>		
Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		E
Pulse input, 2x input (In1 and In2)		F
Pulse out-/input combination, 2x input and 1x output		G
<u>Combination of 2 modules (communication and function module)</u>		
M-Bus module and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		H
M-Bus module and Pulse input, 2x input (In1 and In2)		J
M-Bus module and Pulse out-/input combination, 2x input and 1x output		K
RS 232 module (M-Bus) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		L
RS 232 module (M-Bus) and Pulse input, 2x input (In1 and In2)		M
RS 232 module (M-Bus) and Pulse out-/input combination, 2x input and 1x output		N
RS 485 module (M-Bus) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		P
RS 485 module (M-Bus) and Pulse input, 2x input (In1 and In2)		Q
RS 485 module (M-Bus) and Pulse out-/input combination, 2x input and 1x output		R
Combination current output module, 2x passive 4 ... 20 mA (Out 1 "Power", Out 2 "Flow") (occupies both module Ports 1 and 2)		S
Display units and resolutions		
MWh & kW, m ³ , m ³ /h in 2 digit resolution; Temperature: no decimal figures		C
MWh & kW, m ³ , m ³ /h in 1 digit resolution; Temperature: no decimal figures		D
MWh & kW, m ³ , m ³ /h in 0 digit resolution; Temperature: no decimal figures		E
GJ & kW, m ³ , m ³ /h in 2digit resolution; Temperature: no decimal figures		H
GJ & kW, m ³ , m ³ /h in 1 digit resolution; Temperature: no decimal figures		J
GJ & kW, m ³ , m ³ /h in 0 digit resolution; Temperature: no decimal figures		K
Gcal & kW, m ³ , m ³ /h in 2 digit resolution; Temperature: no decimal figures		M
Gcal & kW, m ³ , m ³ /h in 1 digit resolution; Temperature: no decimal figures		N
Gcal & kW, m ³ , m ³ /h - in 0 digit resolution; Temperature: no decimal figures		P
MBTU & MBTU/h, m ³ , m ³ /h in 2 digit resolution; Temperature: no decimal figures		Q
MBTU & MBTU/h, m ³ , m ³ /h in 1 digit resolution; Temperature: no decimal figures		R
MBTU & MBTU/h, m ³ , m ³ /h - in 0 digit resolution; Temperature: no decimal figures		S
Verification/Approval		
Without type approval mark, neutral label (standard))		0
With MID type approval mark (only for heating combinations, selection "A, B, E and F")		1
With MID approval mark and first MID verification (only for heating, selection A, B, E and F")		2
Cooling approval mark, German national cooling approval according PTB-TR-K7.2 (only for cooling and media water, selection "C and D")		7
Cooling approval mark, German national cooling approval according PTB-TR-K7.2 and first verification (only for cooling and media water, selection "C and D")		8
Further designs		
Please add "-Z" to Article No. and specify Order code		
Certificate		
Including factory test report (certificate) of FUE950	ALWAYS INCLUDED	
Cooling, setup for non water		
Water/glycol setting for media type "Tyfocor LS (R)" (only with neutral label, no verification and approval)		C 0 2
Optional settings/programming		
Tariff function settings (specify in clear text, up to max. 20 characters)		D 0 2
Pulse output setting of option module (specify in clear text, up to max. 20 characters)		D 0 6
Pulse input setting of option module (specify in clear text, up to max. 20 characters)		D 0 8
Pulse input setting of 4 ... 20 mA option module (please specify 20 mA related type and value in clear text, up to max. 20 characters)		D 1 0
Special display units		
Flow in 'GPM' and Volume in 'gal' (x100) (digits/resolution as selected above, only with 0 digit resolution)		L 0 5
Temperature in deg. F (digit resolution as selected above)		L 3 1

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

Flowmeter SITRANS FUE950 operating instructions, accessories and spare parts

Operating instructions

Description	Article No.
• English	A5E03424739

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Accessories

Description	Article No.
Infrared optical head (Bluetooth type) for data acquisition & programming of FUE950	A5E02611768
Bracket for SITRANS FUE950 wall mounting (20 pcs.)	A5E02611769
Cable for data acquisition via RS 232 PC/D-sub 9F/3 wire	A5E02611774
Basic version of programming software tool for FUE950	free download from internet
Expert version of programming software tool for FUE950	A5E03478951
Test Lab. version of re-programming software tool for FUE950 (Note: Before using this Test-Lab version an online training must be completed)	A5E03461778

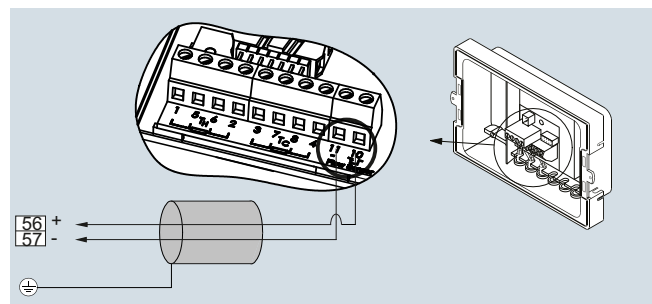
Spare parts

Description	Article No.
Add-on modules for FUE950 (only for 7ME348 versions)	
Pulse input module (2 inputs)	A5E03461432
Pulse output module (2 outputs)	A5E03461436
Combined pulse in-/output module (2 inputs and 1 output)	A5E03461437
RS 232 module (M-Bus protocol)	A5E03461459
RS 485 module (M-Bus protocol)	A5E03461512
M-Bus module	A5E03461516
Combined current output module, 2 x passive 4 ... 20 mA	A5E03461583
Connection cable for option modules (types: Pulse, RS 232/RS 485, M-Bus, mA) (special connection cable with 2 plugs)	A5E03461585
Power supply for FUE950 (only for 7ME348 versions)	
3.6 V D-cell battery for SITRANS FUE950	A5E03461708
230 V AC supply module (incl. internal fuse T50 mA L 250 V and back-up battery) for SITRANS FUE950	A5E03461717
24 V AC supply module for SITRANS FUE950, incl. back-up battery	A5E03461719
Pocket for temperature sensors Pt500 (for related 4-wire Pt500 type only, 1 pc.)	
Stainless steel pocket (1 pc.), 135 mm length for 6 mm sensor diameter, max. PN 40 and max. 5 m/s (recommended for 140 mm sensor length).	A5E03462868
Stainless steel pocket (1 pc.), 225 mm length for 6 mm sensor diameter, max. PN 40 and max. 5 m/s (recommended for 230 mm sensor length).	A5E03462870

Description	Article No.
Pt500 4-wire temperature sensor pair, with MID MI004 and PTB K7.2 approvals and verification (for related 4-wire sensor pocket types only)	
Pt500 sensor pair (6/140 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 140 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01 (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).	A5E03462872
PT500 sensor pair (6/230 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 230 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01 (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).	A5E03462878
FUE950 enclosure (only for 7ME348 versions)	
Bottom part of FUE950 enclosure (1 pc.)	A5E03461508
Snap fit for FUE950 enclosure (1 pc.)	A5E30461731
Pocket for Pt500 temperature sensors (for corresponding 2-wire Pt500 types only, 1pc.)	
Brass pocket 6 mm, G½B x 40 mm (PN 16), 1 pc.	A5E02611778
Brass pocket 6 mm, G½B x 85 mm (PN 16), 1 pc.	A5E02611779
Brass pocket 6 mm, G½B x 120 mm (PN 16), 1 pc.	A5E02611780
Stainless steel 6 mm, G½B x 85 mm (PN 25), 1 pc.	A5E02611781
Stainless steel 6 mm, G½B x 120 mm (PN 25), 1 pc.	A5E02611783
Stainless steel 6 mm, G½B x 155 mm (PN 25), 1 pc.	A5E02611792
Stainless steel 6 mm, G½B x 210 mm (PN 25), 1 pc.	A5E02611793
Pt500 temperature sensor pair, 2-wire cable, 6 mm sensor diameter, with MID/EN-approval (for corresponding 2-wire sensor pocket types only)	
Cable length:	
2 m	A5E02611794
3 m	A5E02611795
5 m	A5E02611796
10 m	A5E02611798

Schematics

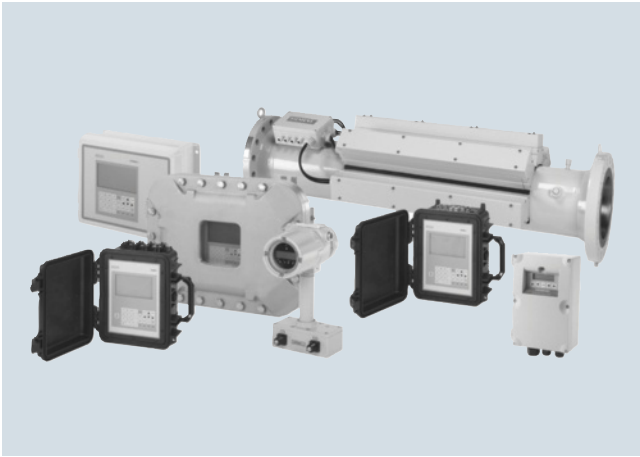
Electrical connection for SITRANS FUS380/FUE380/FUE950 and MAG 5000/6000/FUE950



The diagram shows the connection between SITRANS FUE950 (terminals 10 and 11) and FUS380/FUE380 and MAG 5000/6000 (terminals 56 and 57). Temperature sensors must be connected to terminals 5 (1) and 6 (2) (T_H) and 7 (3) and 8 (4) (T_C).

Note:
 The right flowmeter pulse output value must be equal to the FUE950 pulse input value and must be checked via the user menu of the transmitter MAG 5000/6000 or nameplate of FUE380 or FUS380.

Overview



SITRANS F US clamp-on ultrasonic flowmeters provide highly accurate measurement while minimizing installation time and maintenance expense.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single, dual or multiple channel versions and a variety of enclosures - to suit your operating conditions and requirements

Application

SITRANS F US clamp-on ultrasonic flowmeters have seven product families, each targeting specific applications:

SITRANS FUS1010 Standard and SITRANS FUP1010 Portable flowmeters are suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot & cold water systems
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

SITRANS FUE1010 Energy flowmeters are ideally suited to thermal energy/power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

SITRANS FUH1010 Oil flowmeters are ideal for applications carrying crude oil, refined petroleum or liquefied gas. There are three application areas: Interface detection, precision volume and standard volume.

Interface detection

- Precise identification of interfaces on multi-liquid pipelines
- Product identification
- Density indication

Precision volume

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- Scraper ("pig") detection
- Chemical and petrochemical processing

SITRANS FUG1010 Gas flowmeters are ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) analysis
- Production
- Storage

SITRANS FST020 Basic flowmeters are suitable for most clean liquid applications, including the following:

- Water & wastewater industry
 - Potable water
 - Wastewater, influent & effluent
 - Processed sewage, sludge
- Chemical feed industry
 - Sodium hypochlorite
 - Sodium hydroxide
- HVAC & power industries
 - Coolant flow
 - Fuel flow
- Process control
 - Chemicals
 - Pharmaceuticals

Flow Measurement

SITRANS F US Clamp-on

Clamp-on ultrasonic flowmeters

SITRANS FUT1010 Liquid and gas flowmeters are suitable for liquid and gas applications, including the following:

- Liquid
 - Pipeline balancing
 - Terminal transmix metering
 - Refinery blending
 - Airport facility management
 - Petrochemical processing
 - Plant optimization
- Gas
 - Production wells
 - Underground storage
 - Transmission
 - Electric power generation
 - Gas processing plants

System information and selection guide

SITRANS F US Clamp-on flowmeters	FUS1010 (Standard)	FST020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)	FUT1010 (Liquid/Gas)
Industry/Applications							
Water and aqueous solutions	X	X	X	X			
Utility district heating, cooling	X	X	X	X			
Chemical	X	X	X				
Hydrocarbons/Petrochemical, multiple products or varying viscosity, liquefied gases, net and gross volume					X		X
Hydrocarbons (Single product with limited viscosity range) gross volume	X		X		X		X
Very low flow (< 0.1 m/s) in small pipes	X	X	X				
Natural gas						X	X
Process gas						X	X
Slurries or liquids with high percentage of undissolved gases	X ⁴⁾		X	X			
High temperature liquids > 120 °C (248 °F)	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾		
Aerospace or hydraulic test	X ²⁾		X ²⁾				
Refrigeration liquids	X	X	X	X			
Food products	X	X	X				
Design							
Field clamp-on (non-intrusive)	X	X	X	X	X	X	X
Doppler (Reflexor) hybrid capability	X ⁴⁾		X	X			
Standard volume or mass flow; per API 2540					X		X
Interface detection					X		X
Density output					X		X
Standard volume or mass flow; per AGA 8						X	X
Differential temperature with energy calculation				X			
Temperature measurement	X		X	X	X	X	X
Analog input	X		X	X	X	X	X
Large graphics display	4)		X	X	4)	4)	X
Diagnostic PC software (Si-Ware)	X	X	X	X	X	X	X
Number of acoustic paths and channels							
1-channel	X	X	X	X	X	X	X
2-path	X		X	X	X	X	X
2-channel w/arithmetic function	X		X	X			
4-path/(special order)	X				X	X	X
4-channel w/sum of active channels	X						
Transmitter enclosure							
IP65 (NEMA 4X) wall mount	X	X		X	X	X	X
IP67 weatherproof			X				
IP40 (NEMA 1) portable				X ³⁾			
IP65 (NEMA 7) compact explosionproof	X				X	X	
IP66 (NEMA 7) wall mount explosion-proof	X				X	X	X

1) Special order high temperature clamp-on sensor

2) Special order Aerospace clip-on sensor recommended

3) Available with portable energy systems

4) Not for NEMA 7 compact explosionproof

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

SITRANS F US Clamp-on flowmeters	FUS1010 (Standard)	FST020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)	FUT1010 (Liquid/Gas)
Power Supply							
Internal battery operation			X	X ¹⁾			
Battery charger (100 ... 240 V AC 50 ... 60 Hz) with country specific line cord			X	X ¹⁾			
90 ... 240 V AC, 50 ... 60 Hz	X	X		X	X	X	X
9 ... 36 V DC ⁴⁾	X	X		X	X	X	X
Size (For larger pipes, see spares list for appropriate sensors and mountings.)							
6.5 ... 9150 mm (0.25" ... 360.24")	X	X	X				
38 ... 9150 mm (1.5" ... 360.24")				X	X	X	
Approvals							
FM/CSA ²⁾⁵⁾	X			X ³⁾	X	X	X
ATEX ⁵⁾	X				X	X	X
UL/ULc ⁵⁾		X	X	X			
C-TICK ⁵⁾	X	X		X	X	X	

¹⁾ Available with portable energy systems

²⁾ NEMA 4X associated equipment in DIV 2 connected to DIV 1 sensors, NEMA 7 explosionproof equipment in DIV 1 connected to DIV 1 sensors.

³⁾ Not for portable enclosure

⁴⁾ -Neg and +pos ground available for compact NEMA 7

⁵⁾ Products are marked with CE as required by european directive.

Sensor type selection guide

Application condition. Note all that apply before making selection	Standard sensor supported in MLFB			Notes
	High precision	Universal	(Reflexor)	
Media				
General survey (clean liquids) on non-steel pipes		X	O	
General survey (clean liquids) on a limited range of steel pipes	X		O	
Moderately aerated liquid or slurry, up to 121 °C (250 °F)	X			
Highly aerated liquid or slurry	O	O	X	
Permanent installation on steel pipe (clean liquids)	X		O	
Installation in offshore or corrosive environment	O	X ¹⁾	O	Sensors available with corrosion resistance as special order
Liquid temperature greater than 120 °C (248 °F)	O	X ¹⁾		High temp metal block sensors available as special order (to 230 °C (446 °F))
Operation on single pipeline flowing multiple products	X	O		
Natural gas or process gas	X	O	O	Consult sales specialist for all gas applications
Pipe material				
Steel	X		O	
Steel pipe with diameter/wall thickness ratio <10	O	X		
Non-steel pipe material (copper, ductile iron, cast iron, etc.)	O	X		High precision sensors can also be used on plastic and aluminum pipes
Wall thickness > 31.75 (1.25")	O	X		

O = not suitable X = preferred choice

¹⁾ Available for special order

Definitions

Sensor Chart	Description
Standard	Standard system sensor, plastic body with alu housing, FM, CE
Spare	Available for special application and special pipes. Contact factory for application use. Not available as part of a configured product
Gas	Usable for gas application. Available also as corrosion resistant, frame, track or weldseal mounting, T1, T2. FM, ATEX, CE
CE	All flowmeter and sensors are CE - certified
Ex-FM	Standard, corrosion resistant, frames, weldseal, T1, T2, T3
Ex-ATEX	Option for all corrosion resistant, frames, weldseal, T1, T2, T3
Corrosion resistant	SS Housing instead Alu
Trackless	Fixed only by straps, no other mounting (spacer bar as an option)
Tracks	Portable and dedicated for universal size A/B and for HP size A/B. For all size HT only dedicated
Frames	Portable and dedicated for universal size C,D,E, and for HP size C/D. For universal and HP size B available for pipes >125 OD
Portable	BNC instead F-connector. Mounting universal sensor by portable tracks, frames and spacerbar
Transportable	Dedicated sensor including adapter for portable BNC cables.
WeldSeal	Special SS Frames for FUH1010,FUG1010, but also special FUS1010. Corrosion resistant, Liquid and Gas, T1, T2
T1	Usable -40 to 120°C, but best for Ø Temperature <40°C; Standard
T2	Usable -40 to 120°C, but best for Ø Temperature >40°C - <80°C; Named as high temperature high precision
T3	Usable -40 to 120°C, but best for Ø Temperature >80°C; special request
Submersible	Transducers can be used submersible by denso.

Sensor availability guide

Sensor models	Availability																	
	Standard	Spare only	Gas	Ex-ATEX	Ex-FM	Corrosion resistant	Trackless	Tracks	Frames	Portable	Transportable	WeldSeal	T1 (best use -40 ... 65 °C)	T2 (best use1 ... 104 °C)	T3 (best use 32 ... 120 °C)	Submersible	Cataloge	
Universal Sensor -40 ... 120 °C Alu housing CE IP68																		
A1 Universal for pipe OD – 5.8 ... 50.8 mm (0.23" ... 2")		X		X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X		X							X ¹⁾	
A2 Universal for pipe OD – 12.7 ... 50.8 mm (0.5" ... 2")	X			X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X		X							X ^{1) 2)}	X
B1 Universal for pipe OD – 12.7 ... 76 mm (0.5" ... 3")		X		X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X	X	X							X ¹⁾	
B2 Universal for pipe OD – 12.7 ... 76 mm (0.5" ... 3")		X		X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X	X	X							X ¹⁾	
B3 Universal for pipe OD – 19 ... 127 mm (0.75" ... 5")	X			X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X	X	X							X ^{1) 2)}	X
C1 Universal for pipe OD – 51 ... 254 mm (2" ... 10")		X		X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ¹⁾	
C2 Universal for pipe OD – 51 ... 254 mm (2" ... 10")		X		X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ¹⁾	
C3 Universal for pipe OD – 51 ... 305 mm (2" ... 12")	X			X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ^{1) 2)}	X
D1 Universal for pipe OD – 102 ... 508 mm (4" ... 20")		X		X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ¹⁾	
D2 Universal for pipe OD – 152 ... 610 mm (6" ... 24")		X		X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ¹⁾	
D3 Universal for pipe OD – 203 ... 610 mm (8" ... 24")	X			X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ^{1) 2)}	X
*E1 Universal for pipe OD – 254 ... 3048 mm (10" ... 120")		X		X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ¹⁾	
*E2 Universal for pipe OD – 254 ... 6096 mm (10" ... 240")	X			X ¹⁾	X ¹⁾	X ¹⁾	X		X	X							X ^{1) 2)}	X
*E3 Universal for pipe OD – 304 ... 9144 mm (12" ... 360")		X	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X	X		X ¹⁾					X ¹⁾	

¹⁾ Excluding portable

²⁾ Spare only

³⁾ Usable but not recommended

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

Sensor models	Availability																
	Standard	Spare only	Gas	Ex-ATEX	Ex-FM	Corrosion resistant	Trackless	Tracks	Frames	Portable	Transportable	WeldSeal	T1 (best use -40 ... 65 °C)	T2 (best use1 ... 104 °C)	T3 (best use 32 ... 120 °C)	Submersible	Cataloge
High Precision Sensor -40 ... +120 °C Alu T1 (T2, T3) CE IP68																	
A1H (High Precision) for pipe WT - 0.64 ... 1.0 mm (0.025" ... 0.04")		X	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X			X		X	X	X	X ¹⁾	X
A2H (High Precision) for pipe WT - 1.0 ... 1.5 mm (0.04" ... 0.06")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X			X		X	X	X	X ^{1) 2)}	X
A3H (High Precision) for pipe WT - 1.5 ... 2.0 mm (0.06" ... 0.08")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X			X		X	X	X	X ^{1) 2)}	X
B1H (High Precision) for pipe WT - 2.0 ... 3.0 mm (0.08" ... 0.12")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X	X		X		X	X	X	X ^{1) 2)}	X
B2H (High Precision) for pipe WT - 3.0 ... 4.1 mm (0.12" ... 0.16")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X	X		X		X	X	X	X ^{1) 2)}	X
B3H (High Precision) for pipe WT - 2.7 ... 3.3 mm (0.106" ... 0.128")		X	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ³⁾	X	X		X		X	X	X	X ¹⁾	X
C1H (High Precision) for pipe WT (stainless steel construction) - 4.1 ... 5.8 mm (0.16" ... 0.23")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X		X	X ¹⁾	X	X	X	X ^{1) 2)}	X
C2H (High Precision) for pipe WT (stainless steel construction) - 5.8 ... 8.1 mm (0.23" ... 0.32")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X		X	X ¹⁾	X	X	X	X ^{1) 2)}	X
* D1H (High Precision) for pipe WT (stainless steel construction) - 8.1 ... 11.2 mm (0.32" ... 0.44")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X		X	X ¹⁾	X	X	X	X ^{1) 2)}	X
* D2H (High Precision) for pipe WT (stainless steel construction) - 11.2 ... 15.7 mm (0.44" ... 0.62")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X		X	X ¹⁾	X	X	X	X ^{1) 2)}	X
* D3H (High Precision) for pipe WT (stainless steel construction) - 7.4 ... 9.0 mm (0.293" ... 0.354")		X	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X		X	X ¹⁾	X	X	X	X ¹⁾	X
* D4H (High Precision) for pipe WT (stainless steel construction) - 15.7 ... 31.8 mm (0.62" ... 1.25")	X		X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X		X		X	X ¹⁾	X	X	X	X ^{1) 2)}	X
High Temperature Universal Sensor -40 ... +230 °C																	
High Temperature size 1 ... 230 deg C (diam. 12.7 ... 100 mm)		X		X ¹⁾	X ¹⁾				X		X						
High Temperature size 2 ... 230 deg C (diam. 30 ... 200 mm)	X			X ¹⁾	X ¹⁾				X		X						X
High Temperature size 3 ... 230 deg C (diam. 150 ... 610 mm)	X			X ¹⁾	X ¹⁾				X		X						X
High Temperature size 4 ... 230 deg C (diam. 400 ... 1200 mm)	X			X ¹⁾	X ¹⁾				X		X						X
High Temperature size 2A ... 230 deg C (diam. 30 ... 200 mm)		X		X ¹⁾	X ¹⁾				X		X						
High Temp. size 3A ... 230 deg C (diam. 150 ... 610 mm)		X		X ¹⁾	X ¹⁾				X		X						
High Temp. size 4A ... 230 deg C (diam. 400 ... 1200 mm)		X		X ¹⁾	X ¹⁾				X		X						
Doppler Sensor																	
Doppler Sensor, for up to 121 °C (250 °F)	X			X ¹⁾	X ¹⁾		X			X						X ¹⁾	X
Corrosion Resistant Doppler, for up to 121 °C (250 °F)		X		X ¹⁾	X ¹⁾	X ¹⁾	X										

¹⁾ Excluding portable

²⁾ Spare Only

³⁾ Useable but not recommended

Sensor mounting availability guide

	Sensor							
	Universal NEMA	Universal portable	WeldSeal sensors	Dedicated gas and liquid flow HP sensors	Portable liquid flow HP sensors	High temperature universal sensors	Doppler NEMA	Doppler portable
Mounting								
Trackless	X	X		X	X		X	X
Tracks universal dedicated	X	X ¹⁾						
Tracks universal portable	X ¹⁾	X						
Tracks HP dedicated				X	X ¹⁾			
Tracks HP portable				X ¹⁾	X			
Frames universal dedicated	X	X ¹⁾						
Frames universal portable	X ¹⁾	X						
Frames HP dedicated				X	X ¹⁾			
Frames HP portable				X ¹⁾	X			
Tracks high temp universal						X		
WeldSeal single enclosure			X					
WeldSeal dual enclosure			X					
SpacerBar	X	X		X	X			
Straps	X	X ¹⁾		X	X ¹⁾	X	X	X ¹⁾
Chains tension hook		X			X			
Chains EZ-Clamp 1	Size C, D	Size C, D		Size C	Size C			
Chains EZ-Clamp 2	Size E	Size E		Size D	Size D			
Denso	X			X			X	
Doppler-Chains								X

¹⁾ Useable but not recommended

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

Input/output and function availability guide

		Output									Input										
		Standard	Additional inputs	Expanded/Enhanced	4 ... 20 mA active	4 ... 20 mA passive	0 ... 10 V	0 ... 5 kHz	p-gen (20 ... 40 kHz)	Relais - Dry reed	Status allarm	4 ... 20 mA passive	0 ... 10 V	100 Ohm RTD	NoTot	CirTot	ATEX	Unimass	Modbus	Doppler	
FUS1010	NEMA 4X and NEMA 7 wall mount	Single channel	X			2	2	2		4				1	1	X		X	X		
			X	X		2	2	2		4		4	1	1	1	X	X	X	X		
		Dual channel	X			2 ³⁾	2	2		4 ⁴⁾					2	2	X		X	X	
			X	X		2 ³⁾	2	2		4 ⁴⁾		4 ⁴⁾	2	2	2	X	2	X	X		
		Dual path	X		X	2 ³⁾	4 ⁴⁾	2	2		4 ⁴⁾				2	2	X		X	X	
			X	X		2	2	2		4					1	1	X		X	X	
	NEMA 7 compact	Single channel	X			2	2			4		1					X				
			X	X		2	2			4		1	1	1	X	X					
		Dual channel	X			2 ³⁾	2 ³⁾			4 ⁴⁾		2 ³⁾					X	X			
			X	X		2 ³⁾	2 ³⁾			4 ⁴⁾		2 ³⁾	2			X	X				
		Dual path	X		X	2	2			4 ⁴⁾		4 ⁴⁾	2	1		X	X				
			X	X		2	2			4 ⁴⁾		2	1		X	X					
FST020	NEMA 4X wall mount	X			1	1			1												
FUP1010	IP67	Single channel	X		1	1	1		2										X		
Dual channel/path		X		2 ³⁾	2 ³⁾	2 ³⁾		4 ⁴⁾											X		
FUE1010	NEMA 4X	Single channel	X	X		2	2	2	4		4	2	1	1	FM		X	X			
X			X		2 ³⁾	2 ³⁾	2 ³⁾		4 ⁴⁾		2 ³⁾	4	2	2	FM		X	X			
Dual channel		X	X	2 ³⁾	2 ³⁾	2 ³⁾		4 ⁴⁾		2 ³⁾	4	2	2	FM		X	X				
		X	X	2	2	2	4		4		2	4	1	1	FM		X	X			
NEMA 1 portable	Dual channel/path	X	X		2 ³⁾	2 ³⁾	2 ³⁾		4 ⁴⁾		2	4	2	2				X			
FUH1010	NEMA 4X and NEMA 7 wall mount	Single channel	X	X		2	2	2	4			1	1	1	X		X				
Dual path		X	X		2	2		2	4		2	1	1	1	X		X				
		X	X ²⁾	2	2	2		2	4		2	1	1	1	X		X				
NEMA 7 compact	Single channel	X	X		1			1	1			1	1	1	X						
	Dual path	X	X		2				2			1	1	1	X						
X		X		2				1	1			1	1	1	X						
FUG1010	NEMA 4X and NEMA 7 wall mount	Single channel	X	X		2	2		2	4			1	1	1	X		X			
Dual path		X	X		2	2	2		2	4		2	1	1	1	X		X			
Four path		X	X		2	2	2		2	4		2	1	1	1	X		X			
NEMA 7 compact	Single channel	X	X		1			1	1			1	1	1	X						
	Dual channel	X	X		2				2			1	1	1	X						
X	X		2				1	1			1	1	1	X							

¹⁾ Fixed to IO adjustment

²⁾ Not available for Interface Detector

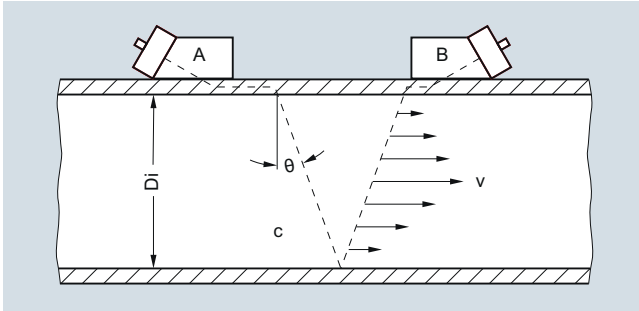
³⁾ One per channel

⁴⁾ Two per channel

Function

Operating Principle

The SITRANS F US system is a transit-time ultrasonic meter that provides exceptional performance using a non-intrusive clamp-on approach. Ultrasonic sensors transmit and receive acoustic signals directly through the existing pipe wall, where the fluid refraction angle is governed by Snell's law of refraction.



Clamp-on sensor mounted in a reflect configuration

The beam refraction angle is calculated as follows:

$$\sin\theta = c / V_{\phi}$$

c = Velocity of sound in fluid

V_{ϕ} = Phase velocity (a constant in the pipe wall)

The flowmeter automatically compensates for any change in fluid sound velocity (or beam angle) in response to variations in the average transit time between sensors A and B. By subtracting the computed fixed times (within the sensors and pipe wall) from the measured average transit time, the meter can then infer the required transit time in the fluid (T_{Fluid}).

The sound waves traveling in the same direction as flow ($T_{A,B}$) arrive earlier than sound waves traveling against the direction of flow ($T_{B,A}$). This time difference (Δt) is used to compute the line integrated flow velocity (v) as shown in the equation below:

$$v = V_{\phi} / 2 \cdot \Delta t / T_{\text{Fluid}}$$

Once the raw flow velocity is determined, the fluid Reynolds Number (Re) must be determined to properly correct for fully developed flow profile. This requires the entry of the fluid's kinematic viscosity (visc) as shown in the equations below, where Q represents the final flow profile compensated volumetric flow rate.

$$Re = Di \cdot v / \text{visc} \cdot Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$$

v = Flow velocity

$\text{visc} = \mu / \rho$ = (dynamic viscosity / density)

$K(Re)$ = Reynolds flow profile compensation

In wetted type ultrasonic flowmeters the meter constants are configured prior to leaving the factory. As this is not possible with clamp-on meters, the settings must be made by the customer at the time of installation. These settings include pipe diameter, wall thickness, liquid viscosity, etc.

SITRANS Clamp-On flowmeters that include temperature sensing can be configured to dynamically infer changes in fluid viscosity for the purpose of computing the most accurate flow profile compensation (K_{Re}).

Ultrasonic Sensor Types

Three basic types of Clamp-On sensors can be selected for use with the SITRANS F US flowmeter. The lower cost "universal" sensor is the most common type in the industry and is suitable for most single liquid applications where the sound velocity does not vary much. This sensor type can be used on any sonically conductive pipe material (including steel) making it well suited for portable survey applications. Universal sensors are selected

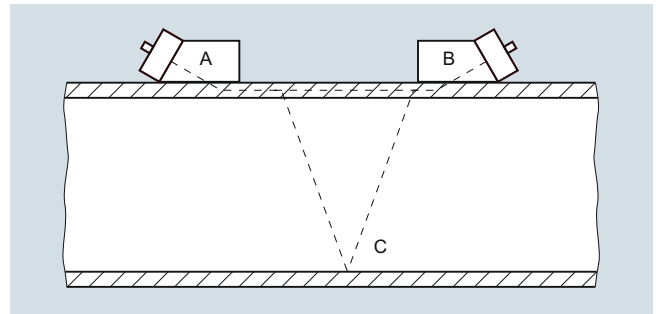
based on the pipe diameter range alone, so wall thickness is less important to the selection process.

The second sensor type is the WideBeam sensor (called high precision), which utilizes the pipe wall as a kind of waveguide to optimize the signal to noise ratio and provide a wider area of vibration. This makes this kind of sensor less sensitive to any change in the fluid medium.

The WideBeam sensor is designed for steel pipes, but can also be used with aluminum, titanium and plastic pipe. It is the preferred sensor for HPI and gas applications. Note that unlike the universal type, this sensor selection is dependent only on the pipe's wall thickness.

Automatic Zero Drift Correction (ZeroMatic Path)

When WideBeam sensors are installed in the "Reflect" mode shown below, the acoustic signal travels in two different paths between sensors A and B. One path "ACB" travels through the pipe wall and fluid, while the other path "AB" never enters the fluid medium.

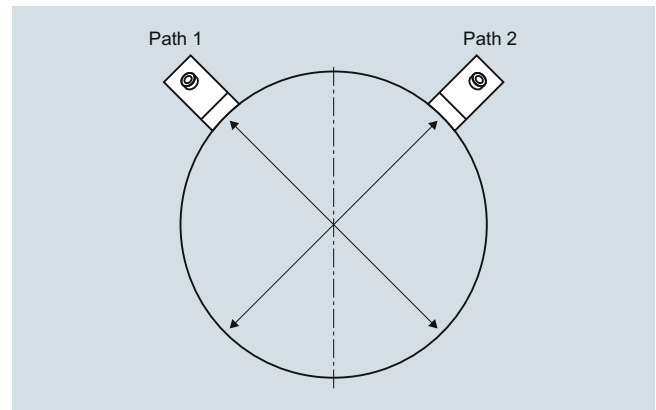


This later path provides the meter with a reference signal that is completely independent of flow rate and can therefore be used as a measure of sensor "mis-match". By continually analyzing this pipe wall signal the SITRANS FUS1010 meter can dynamically correct for flow errors caused by zero drift.

Multi-Channel Flowmeters

For improved flow profile averaging, redundancy or better cost per measurement, Clamp-On meters can be supplied with 2, 3 or 4 path measurement systems.

In the standard FUS, FUP, FUE systems, these channels can be installed on separate independent lines or in a multi-beam installation as shown below. This choice is made during meter setup, where either a multi-path (two paths on same pipe) or multi-channel installation can be selected.



Dual path installation example

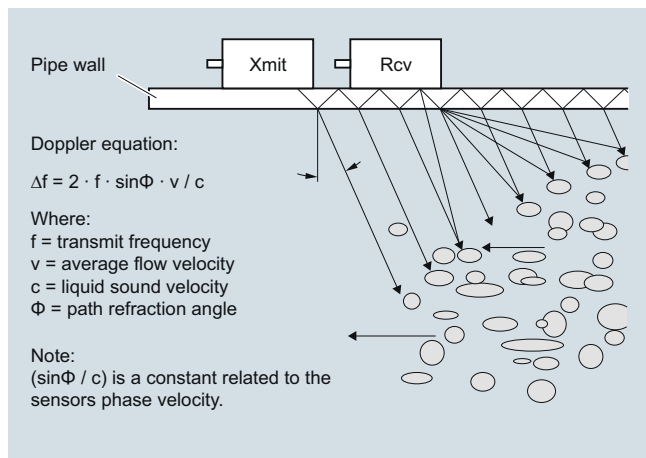
Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

Doppler (Reflexor) Operation

The Doppler measurement technique relies on the reflection of sound energy off tiny gas bubbles or suspended particles to create a doppler shift in the fixed frequency acoustic transmit signal, as shown below.



When de-demodulated using FFT signal processing, this doppler shifted frequency (Δf) can be used to measure the flow rate as described in the associated doppler equations below.

Although the standard transit time measurement system is very tolerant of high levels of liquid aeration and high solids content, there will be cases where insufficient signal will be available for operation with transit time mode. For these cases the FUS, FUP and FUE meters can be ordered with this optional doppler capability, which requires an additional doppler sensor.

SITRANS meter family description

SITRANS FUS1010 Standard flowmeters

The SITRANS FUS1010 system is a basic function permanent (or dedicated) clamp-on meter that is available with a full range of safety approvals, I/Os and enclosure types. This meter can be used in a wide range of applications but does not include the special functions found in the hydrocarbon FUH and energy FUE flowmeters.

The SITRANS FUS1010 meter is typically programmed with a fixed viscosity and specific gravity entry, which can limit the mass flow and volumetric flow accuracy when highly variable (multi-product) liquid properties flow through the same pipeline.

If this meter is ordered with the Type 3 hardware and program configuration, it will have the ability to accommodate clamp-on RTDs, or an analog input from a temperature transmitter. With an active measurement of liquid temperature the meter can then be programmed to compensate for changes in liquid density and viscosity by mean of a "UniMass" table (for advanced users).

SITRANS FST020 Basic flowmeters

The SITRANS FST020 system has the same basic function of the SITRANS FUS1010 system, but does not include the same I/O capability or safety approval rating of the SITRANS FUS1010. This basic meter is intended for single liquid applications that do not require these additional features, such as doppler and uni-mass. Note that the SITRANS FST020 is not available with hazardous area approvals.

SITRANS FUP1010 Portable flowmeters

The SITRANS FUP1010 meter has all the capabilities of the SITRANS FUS1010 meter, but in a battery powered portable configuration. This meter is ideal for general flow survey work where high accuracy is required. Note that the FUP meter is not available with hazardous areas approvals.

SITRANS FUE1010 Energy flowmeters

By combining clamp-on transit time flow measurement with accurate temperature differential measurement, the SITRANS FUE1010 system provides a solution to thermal energy metering with no interruption of service. Energy measurement can be provided for water, ethylene glycol and brine solutions or steam condensate.

Absolute and differential temperature measurement is accomplished with the use of 2 matched 1 k Ω RTD elements installed on the supply and return side of the heating or cooling system. Efficiency calculation (kW/ton, EER or COP) is also available in systems with the optional analog input capability, which allow the meter to accept a power meter output.

The SITRANS FUE1010 system is available in both dedicated (IP65 (NEMA 4X)) and portable configurations (IP40).

SITRANS FUG1010 Gas flowmeters

Be sure to contact a Siemens clamp-on specialist before placing a gas system order.

This unique Clamp-On gas meter uses the same WideBeam transit time operating principle described above. However, due to the very low density and sound velocity characteristics of gases, this meter requires a high gain signal amplifier and the installation of a pipe damping material.

The pipe damping material consists of an adhesive backed viscoelastic film that is designed to attenuate any stray acoustic transmit energy that may otherwise interfere with the transit time gas signal. Damping material installation requires a clean (grease free) pipe surface with well bonded paint.

The Clamp-On gas meter is capable of operation on most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc) with a typical minimum operating pressure of 10 barg (145 psig). Low molecular weight gases such as helium or hydrogen can also be measured, but at a higher minimum pressure.

Standard volume computation: Can provide a standard volume or mass flow output for fixed gas compositions. All SITRANS FUG1010 Gas meters include analog input capability that can be used for pressure and temperature compensation. With the installation of an AGA8 lookup table this meter can dynamically adjust the compressibility factor (Z_{act}) in response to changes in gas pressure and temperature, as indicate below:

$$\text{Std. Rate} = Q_{act} \cdot P_{act}/P_{base} \cdot T_{base}/T_{act} \cdot Z_{base}/Z_{act}$$

SITRANS FUH1010 Oil flowmeters

There are three models of flowmeters included in the SITRANS FUH1010 family, a precision volume model, used for applications that will flow a wide range of viscosity, a standard volume (mass) model, and an interface detection model. All models rely on a variable referred to as "Liquident", which is used to infer the liquid's viscosity and optionally the liquid's density. This variable represents the measured liquid sonic velocity compensated by the operating temperature and pressure, so for a given liquid product the measured Liquident output will remain constant over a wide range of pressure or temperature.

Precision Volume Option:

This is the lower cost SITRANS FUH1010 meter option that uses the Liquident variable to infer only the actual liquid viscosity. This meter does NOT provide the standard volume, mass flow, liquid identification or density output available in the standard volume meter option described below. The precision volume meter is suitable for any petroleum application where actual volume required as the input to an external RTU or flow transmitter.

Standard Volume Option:

This Liquident variable can also be used to identify the liquid's name (gasoline, fuel oil, crude oil, etc) as well as its physical properties (specify gravity, API, viscosity and compressibility) at base conditions. With this information the meter can be configured to output a temperature and pressure compensated (standard) volume flow rate using the API 2540 and API MPMS chapter 11.2.1 methods as shown below.

Correction for Temperature:

Compute Thermal Expansion Coefficient (α_b):

$$\alpha_b = KO / \rho_b^2 + K1 / \rho_b$$

where: KO and K1 are constants dependent on type of liquid and ρ_b is the liquid density at base conditions

Compute temperature correction factor (K_T):

$$K_T = \rho_b * \text{EXP}(-\alpha_b \Delta T (1 + 0.8 \alpha_b \Delta T))$$

where: $\Delta T = (T - \text{base temperature})$

Correction for Pressure:

Compute Compressibility Factor (F):

$$F = \text{EXP}(A + B T + (C + D T) / \rho_b^2)$$

where: A, B, C and D are constants, and "T" is liquid temperature

Compute pressure correction factor (K_p):

$$K_p = 1 / (1 - F (P_{\text{act}} - P_{\text{base}}) * 10^{-4})$$

Final Volume Correction: $Q_{\text{std}} = Q_{\text{act}} * K_t * K_p$

Available outputs from this meter include: API, Density, Mass Flowrate, Standard Volume Flowrate and Liquid Identification.

Interface Detection Option:

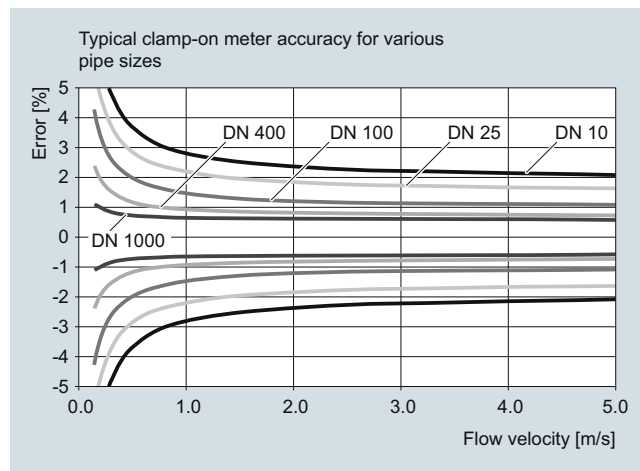
This meter option is designed to provide all the Non-Flow capabilities of a DV meter, making it an ideal non-intrusive alternative to a densitometer. Be aware that this meter does NOT measure flow rate.

SITRANS FUT1010 Liquid and gas flowmeters

The SITRANS FUT1010 is available in two different configurations; a version for liquid hydrocarbon applications and a version for precise gas measurement. Both versions are offered in pipe sizes ranging from 4 inch to 24 inch (DN100 to DN 600) with flange ratings of ANSI Class gas.

General Installation Guidelines for transit time Clamp-On Sensor

- Minimum measuring range: 0 to ± 0.3 m/s velocity (see meter accuracy graph below for more detail)
- Maximum measuring range: 0 to ± 12 m/s (± 30 m/s for high precision sensors). Final flow range determination requires application review



- Pipe must be completely full within the sensor installation volume for accurate flow measurement
- Typical MINIMUM straight pipe requirements are: 10 Diameters upstream/5 Diameters downstream. Additional straight run is required for double out-of-plane elbows and partially open valves. A minimum of 20 upstream diameters is recommended for clamp-on gas systems
- Sensors should be installed at least 20° off vertical for horizontal pipes. This reduces the chance of beam interference from gas buildup at the top of the pipe
- Operation inside the Reynolds transition region, between $1000 < Re < 5000$ should be avoided for best accuracy
- Submersible and direct burial installations can be accommodated. Consult sales representative for details
- Ultrasonic coupling compound is provided with all sensor orders. Insure that a permanent coupling compound is used for long term installations
- Refer to the "Sensor type selection guide" to insure proper application of the equipment

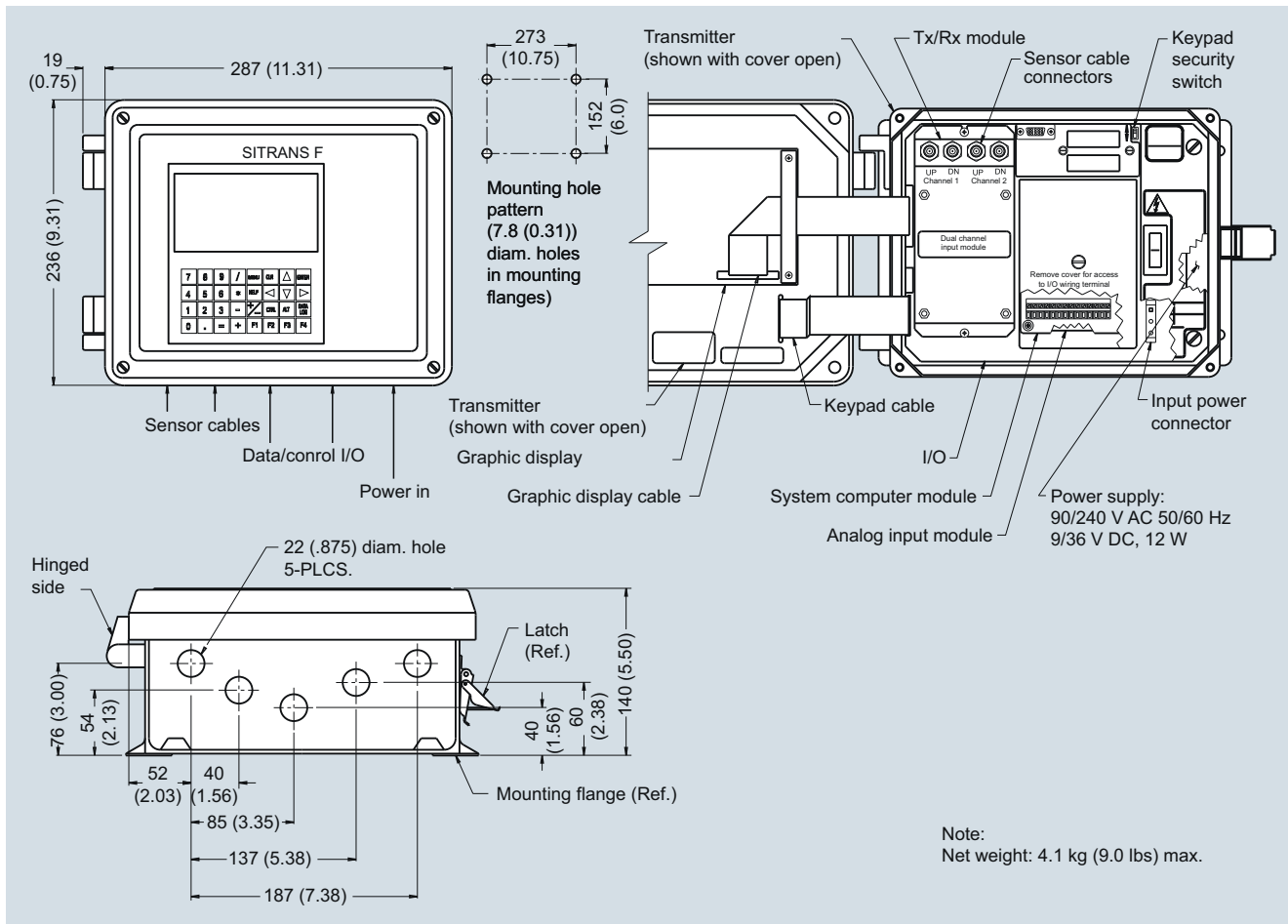
Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

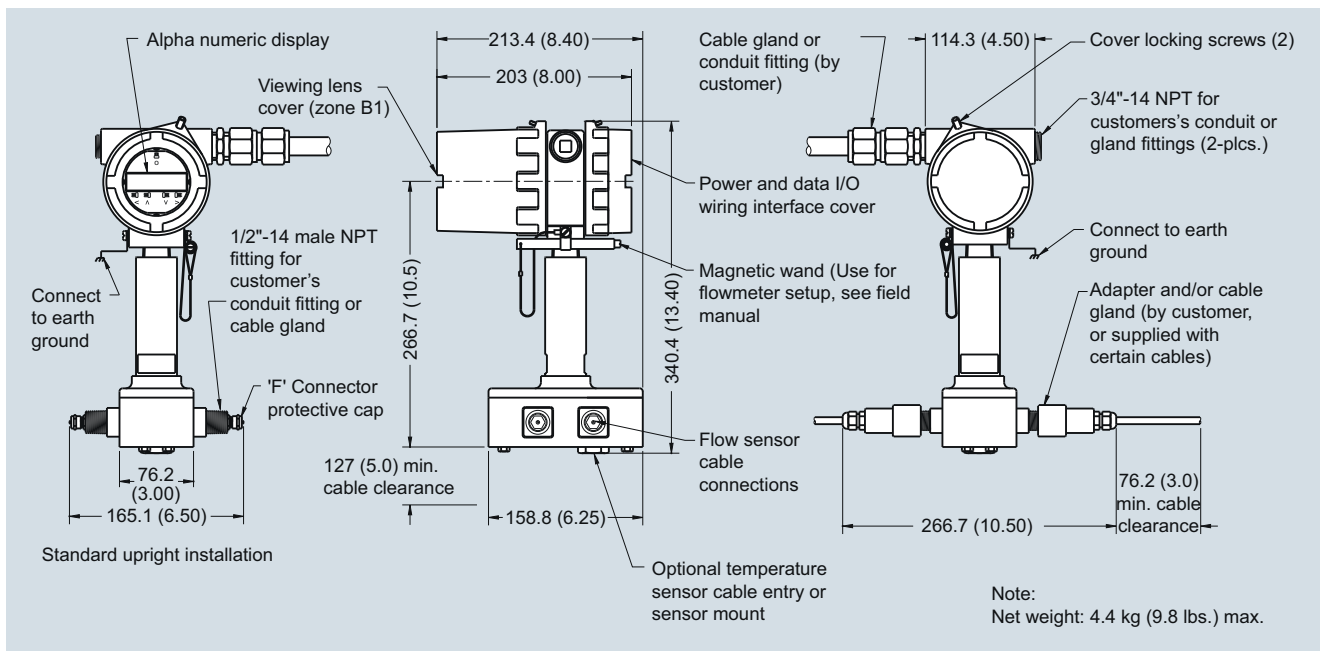
Dimensional drawings

SITRANS FUS1010, FUE1010, FUH1010, FUT1010 and FUG1010 IP65 (NEMA 4X) wall mount enclosure



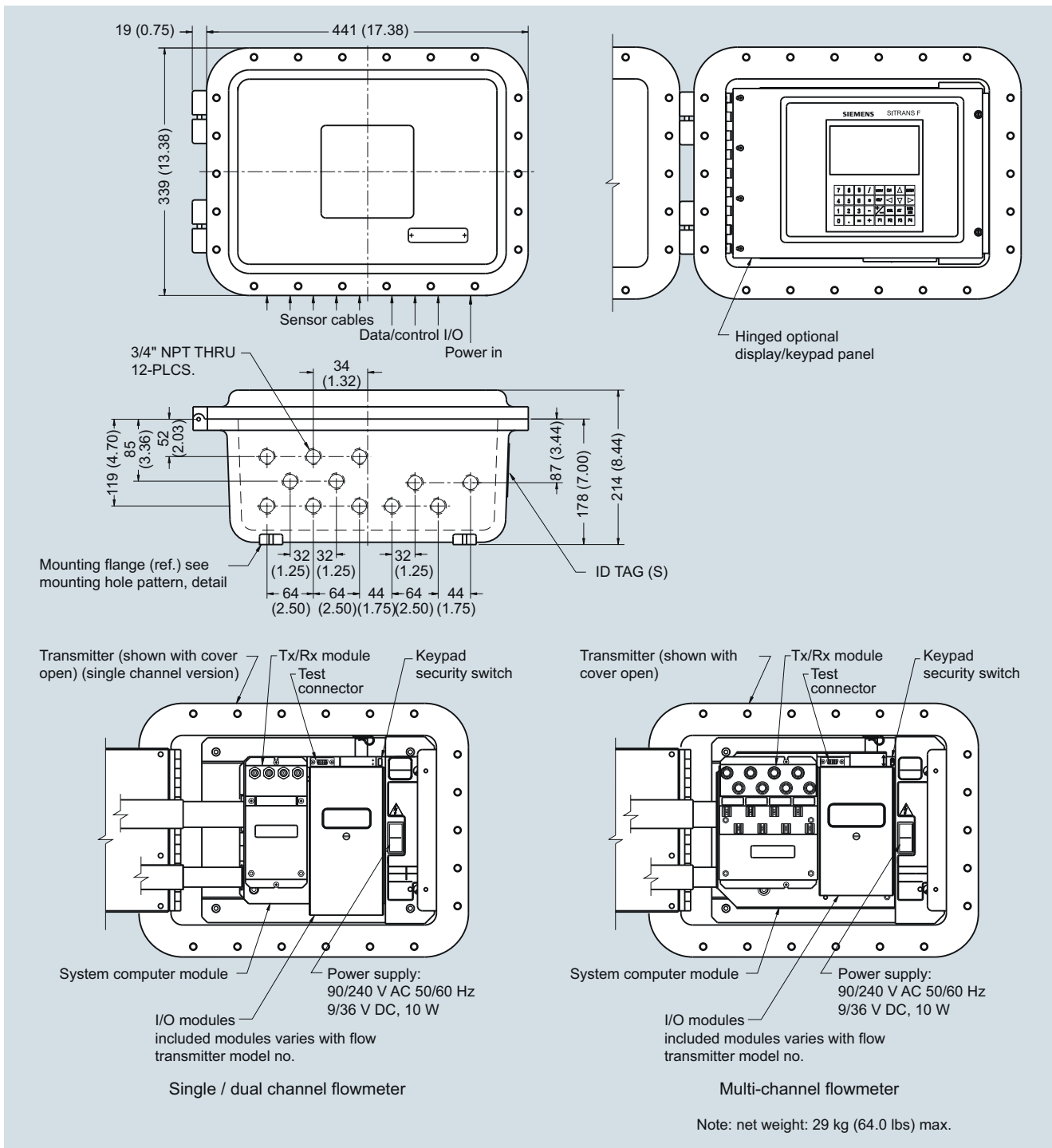
Dimensions in mm (inch)

SITRANS FUS1010, FUH1010 and FUG1010 IP65 (NEMA 7) compact explosionproof enclosure



SITRANS FUS1010, FUH1010, FUT1010 and FUG1010 IP66 (NEMA 7) wall mount explosionproof enclosure

3



Dimensions in mm (inch)

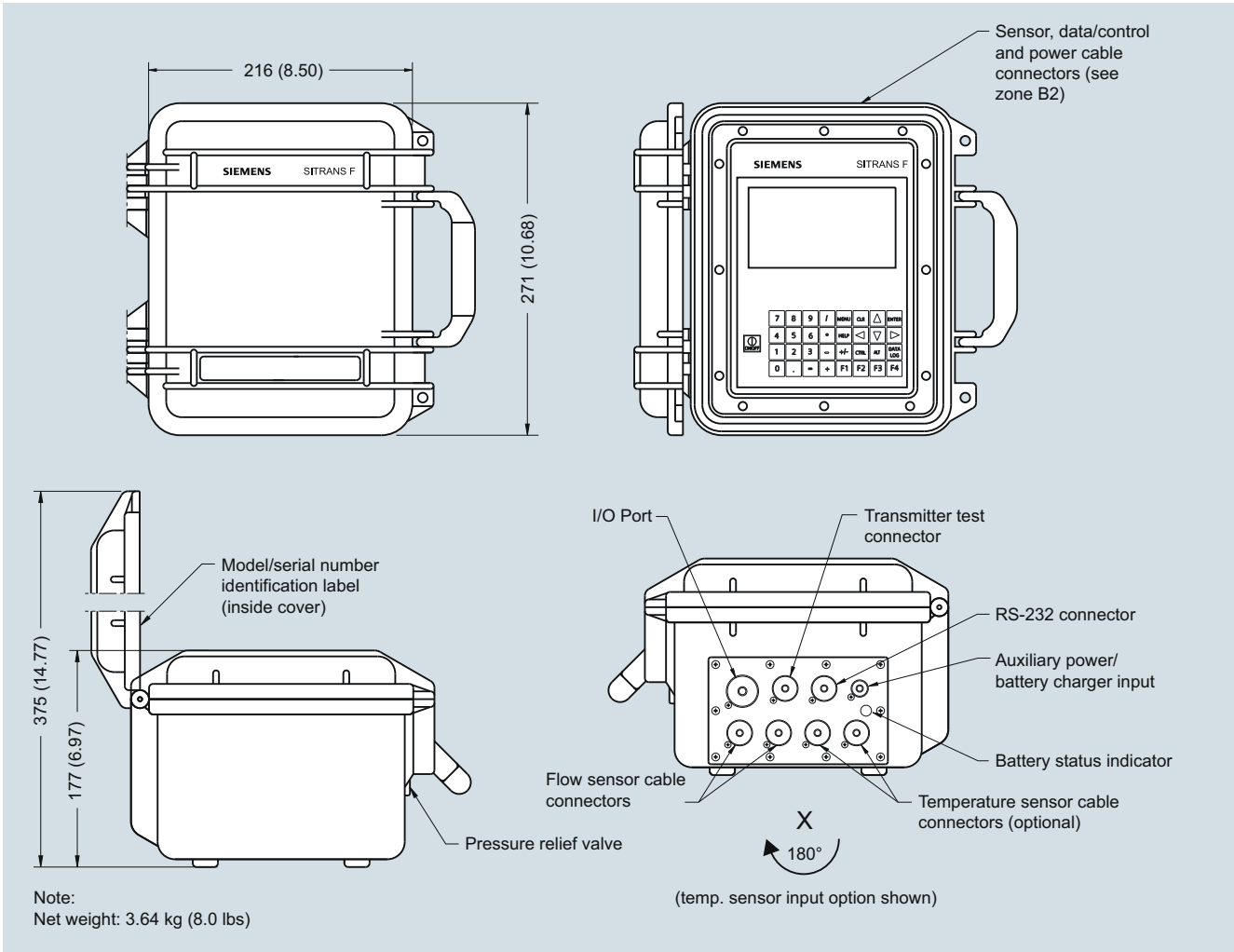
Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

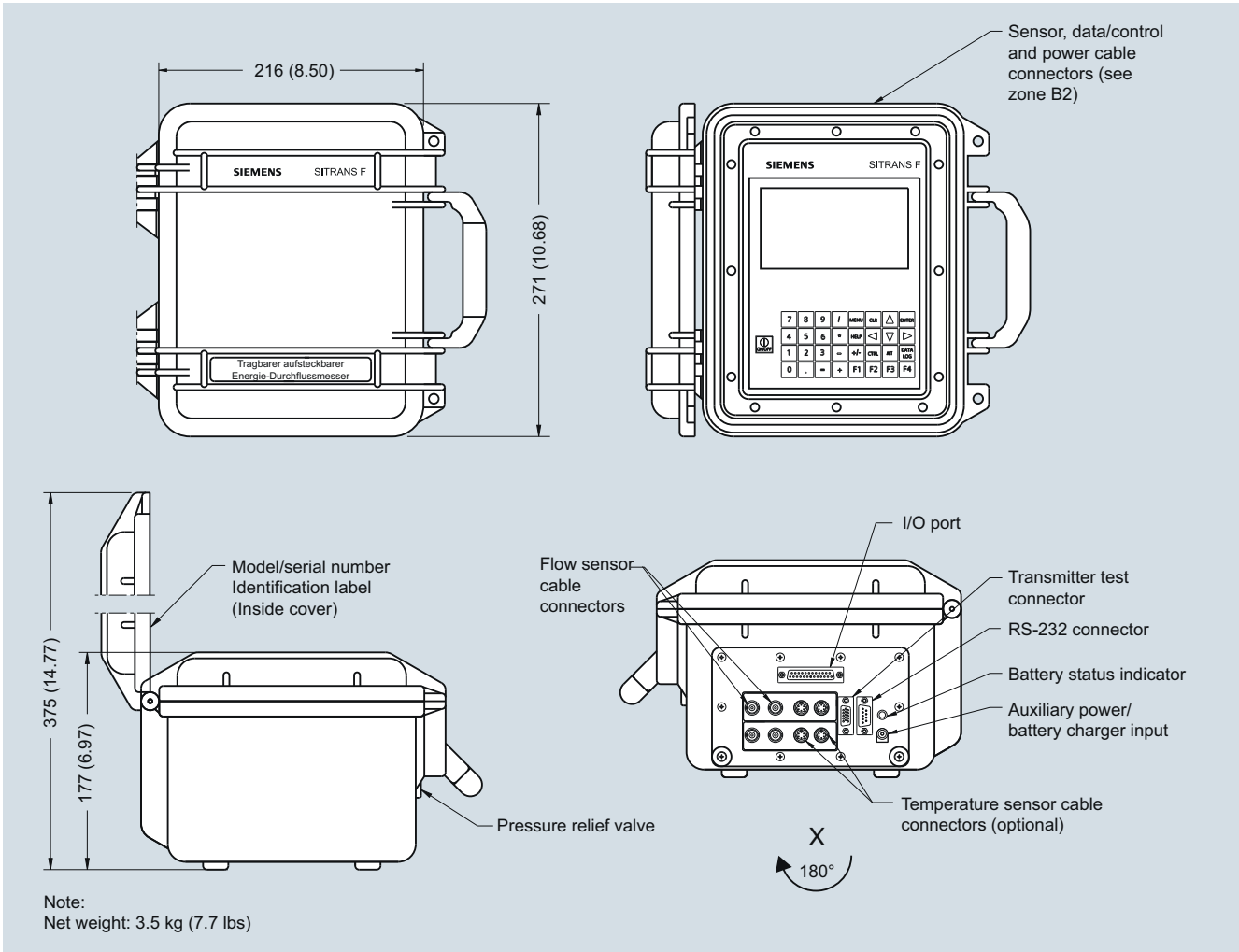
SITRANS FUP1010 IP67 Weatherproof impact resistant enclosure

3



Dimensions in mm (inch)

SITRANS FUE1010 IP40 (NEMA 1) Portable impact resistant enclosure



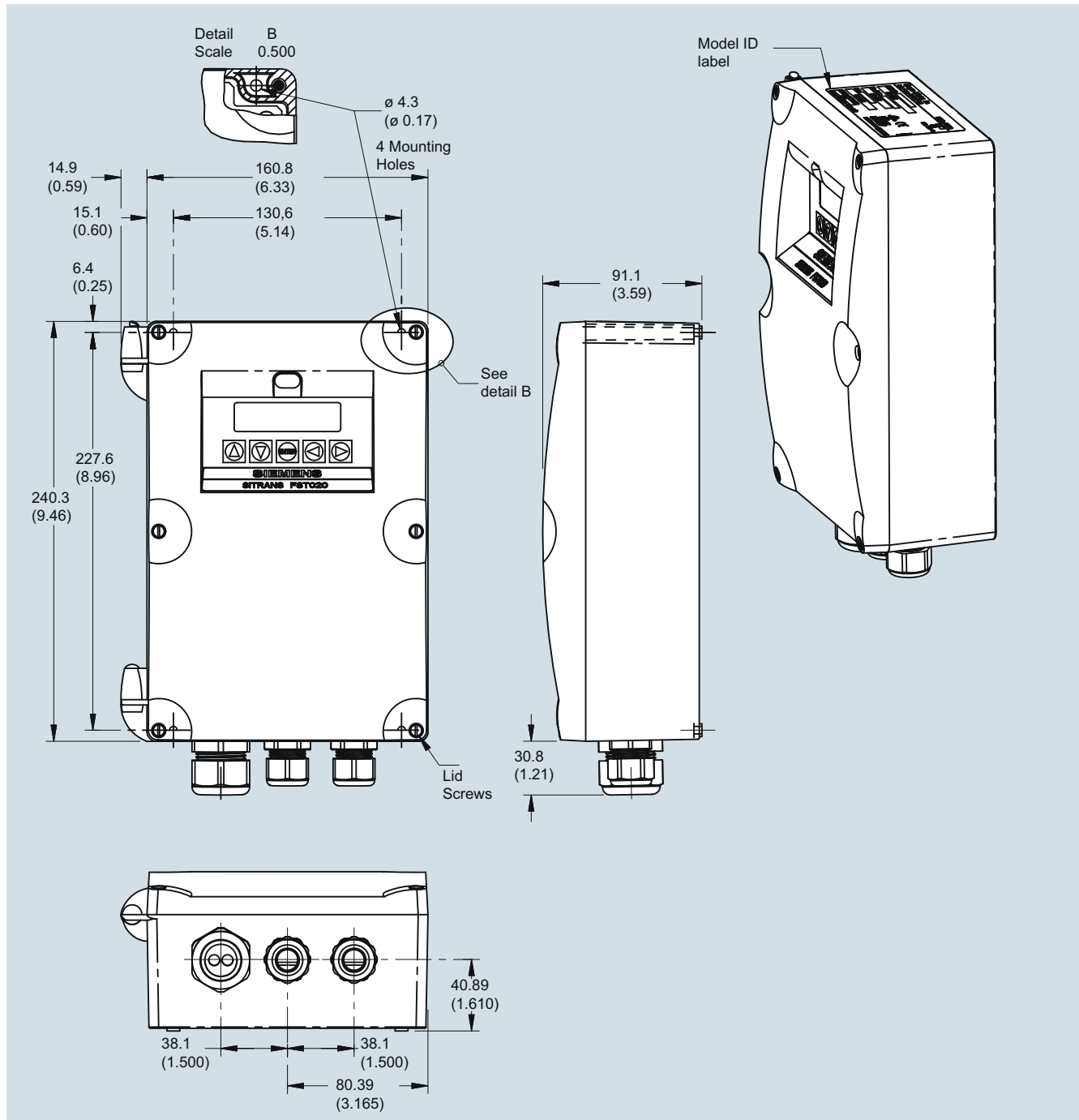
Dimensions in mm (inch)

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US

SITRANS FST020 IP65 (NEMA 4X) wall mount enclosure



Dimensions in mm (inch)

Overview



The thickness gauge is used to measure the wall thickness of the pipe that a clamp-on ultrasonic flowmeter is installed on. The wall thickness value is a vital factor in the flow computation model and a prerequisite for precise clamp-on ultrasonic flow measurement. When measuring any pipe wall thickness the thickness gauge can also be used as a stand-alone tool used to measure the wall thickness of any metallic or non-metallic pipe materials capable of acting as an ultrasonic wave conductor.

Benefits

The thickness gauge is an indispensable tool in accurate clamp-on ultrasonic flow measurement. For a flowmeter to measure correctly it needs to know the exact wall thickness of the pipe it is measuring on. Since even the smallest miscalculation can have a major effect on the flow reading, the pipe thickness gauge has to be extremely precise. This is why the standard probe operates at a 5 MHz frequency making it capable of measuring pipe thickness ranging from 0.1 to 200 mm (0.03" to 7.9") with a very high resolution of up to 0.1 mm (0.004").

Application

The thickness gauge can be used in any field application where there is a need for flow measurement.

Design

The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipe. Such materials include steel, aluminum, titanium, plastics and ceramics. Measurement results are shown in either inches or millimeter; only a simple pre-calibration to a known thickness or sound velocity is required. The simple-to-read 4-digit LCD display featuring a basic user friendly menu is easily navigable with only three conveniently located push buttons. The lightweight computing unit weighs a mere 150 g (5.3 oz) making it ideal for quick and easy on-site pipe wall thickness measurement and with two AAA alkaline batteries trouble-free operation is ensured for 250 hours.

Function

The thickness gauge measurement is based on the transit time ultrasonic wave propagation principle: a high frequency ultrasonic beam is transmitted into the pipe being measured through a probe acting as a sender and receiver. When the probe subsequently retrieves that same signal, an internal counter calculates the time taken for the signals to be sent and received through the pipe. This value is used to evaluate the speed of sound through the pipe and consequently, the thickness of the pipe wall.

Technical specifications

Display type	4-digit LCD
Display resolution	0.1 mm (0.004")
Measurement units	Metric and imperial
Sound velocity range	1 000 ... 9 999 m/s (3 280 ... 32 805 ft/s)
Operating temperature	-10 ... +50 °C (14 ... 122 °F)
Probe/pipe temperature	70 °C (158 °F)
Update rate	4 Hz
Frequency	5 MHz
Power source	2 x 1.5 V AAA dry cells
Power consumption	Working current is less than 3 mA
Battery life	Approx. 250 h on a set of batteries
Dimensions (W x H x D)	61 x 108 x 28 mm (2.4 x 4.3 x 1.1")
Weight	150 g (5.3 oz)

Selection and Ordering data

Article No.

Thickness gauge

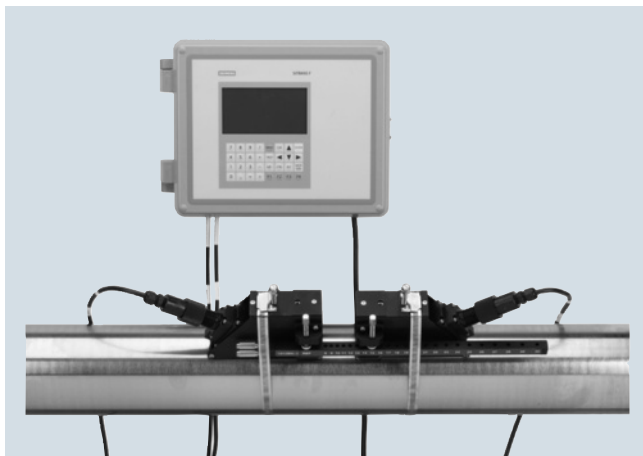
7ME3951-0TG20

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Overview



SITRANS FUS1010 is the most versatile clamp-on ultrasonic flow display transmitter available today. It can operate in either Wide-Beam Transit time or Reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUS1010 is available in single, dual and optional four path configurations, with your choice of IP65 (NEMA 4X) wall mount, IP65 (NEMA7) compact explosionproof enclosures.

Benefits

- Versatility; there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single channel or dual channel/dual path, with doppler capability. Four channel/four path optional.
 - Optional four channels allow measurement of four independent pipes at the same time, reducing overall ownership costs
 - Dual mode allows for transit time and reflexor operation at the same time on the same pipe
 - Dual path allows for two sets of sensors to be set up on one pipe and averaged for higher accuracy
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

SITRANS FUS1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot and cold water systems
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

Design

SITRANS FUS1010 is available in three configurations:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiber-glass reinforced polyester with stainless steel hardware and polyester keypad
 - Single channel
 - Dual channel/dual path
 - Four channel (optional)
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single channel
 - Dual channel/dual path
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, with glass window
 - Single channel
 - Dual channel/dual path
 - Four channel (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow display transmitter has a 2 x 16 Alphanumeric LCD display
- Current, voltage, status alarm, frequency outputs and communications including HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 and VT100 RS 232 (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language selectable on IP65 (NEMA 7) enclosures¹⁾

¹⁾ Available on NEMA 7 compact as MLFB option, all others are software selectable.

Technical specifications

SITRANS FUS1010IP65 (NEMA 4X) wall mount



Enclosure IP65 (NEMA 4X)

Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs Single channel	<ul style="list-style-type: none"> • Current: 20 mA DC • Temperature: 4 wire 1 kΩ RTD
Output	
Standard outputs	<ul style="list-style-type: none"> • Current: 20 mA DC (1 kΩ at 30 V DC) • Voltage: 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT relays • Form C relays • Pulse rate: 5 kHz
Optional outputs	<ul style="list-style-type: none"> • Expanded I/Os (additional 4 ... 20 mA outputs) with form C relays • UniMass (requires RTD) • Communications: HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 and VT100 RS 232
Accuracy	
Accuracy	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	
	5 Hz

Rated operation conditions

Degree of protection	IP65 (NEMA 4X)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply

	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
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Indication and operation

Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French selectable by software

Certificates and approvals

FM and CSA ratings	<ul style="list-style-type: none"> • Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX ratings	<ul style="list-style-type: none"> • Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 • Sensors: Ex II 1 G Ex ia IIC T5
IECEX	Pending

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

SITRANS FUS1010, IP65 (NEMA 7) compact explosionproof



Enclosure IP65 (NEMA 7)

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs per channel	<ul style="list-style-type: none"> • Current: 20 mA DC • Temperature: 4 wire 1 kΩ RTD

Output

Outputs	<ul style="list-style-type: none"> • Current (externally powered): 1 x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Status Alarm: 1 x Isolated open collector • Pulse rate: 5 kHz • VT100 RS 232
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Accuracy

Batch repeatability	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s) ± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
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Data refresh rate	5 Hz
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Rated operation conditions

Degree of protection	IP65 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W 9 ... 36 V DC, 10 W - ground 9 ... 36 V DC, 10 W + ground
Indication and operation	
Data logger memory	1 MByte
Display	2 x 16 alphanumeric LCD display
Keypad	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	<ul style="list-style-type: none"> • Transmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
ATEX ratings	<ul style="list-style-type: none"> • Flow transmitter: Ex II 2 (1) G Ex d [ia] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
IECEX	Pending
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

SITRANS FUS1010 IP66 (NEMA 7) wall mount explosionproof

**Enclosure IP66 (NEMA 7)****Input**

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional Inputs per channel	<ul style="list-style-type: none"> • Current: 20 mA DC • Temperature: 2 x 4 wire 1 kΩ RTD

Output

Outputs single channel	<ul style="list-style-type: none"> • Current: 20 mA DC (1 kΩ at 30 V DC) • Voltage: 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT Relays • Pulse rate: 5 kHz • Communications: HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 and VT100 RS 232
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Accuracy

Accuracy	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Data refresh rate

5 Hz

Rated operation conditions

Degree of protection	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
Indication and operation	
Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	<ul style="list-style-type: none"> • Transmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX ratings	<ul style="list-style-type: none"> • Flow transmitter Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 Ex II 2 (1) G Ex d [ia IIC] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
IECEX	Pending

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Standard MLFB for quick delivery on SITRANS FUS1010 (Dedicated standard)

Selection and Ordering data	Article No.	Order code
SITRANS FUS1010 (Standard)	7ME353 - - 0	+ K02 + K02 + R02
<p>↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>IP65 (NEMA 4X) wall mount</p> <p>Number of channels/ultrasonic paths</p> <p>Single channel</p> <p>Dual channel/Dual path</p> <p>Flowmeter functions and I/O configurations includes graphic display and Reflexor capability</p> <p>Standard outputs</p> <ul style="list-style-type: none"> • 2 x 0 ... 10 V • 2 x 4 ... 20 mA • 2 x pulse output • 4 x relay C type <p>Meter power options</p> <p>90 ... 240 V AC</p> <p>9 ... 36 V DC (except NEMA 7 compact)</p> <p>Communication options</p> <p>VT100 RS 232 (standard)</p> <p>RTD temperature sensor (include mounting hardware for pipes between 1.5" and 24" outer diameter)</p> <p>No RTDs</p> <p>1x standard clamp-on</p> <p>2x standard clamp-on</p> <p>1x submersible</p> <p>2x submersible</p> <p>Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.</p> <p>no sensor</p> <p>A2 universal Trackmount and straps provided up to 75 mm (3")</p> <p>B3 universal Trackmount and straps provided up to 125 mm (5")</p> <p>C3 universal⁽³⁾ Mounting frame and straps provided up to 300 mm (13")</p> <p>D3 universal⁽³⁾ Mounting frame and straps provided up to 600 mm (24")</p> <p>E2 universal⁽³⁾ Mounting frame and straps provided up to 1200 mm (48")⁽¹⁾</p> <p>C1H (high precision)⁽³⁾ Mounting frame and straps provided up to 600 mm (24")⁽²⁾</p> <p>C2H (high precision)⁽³⁾ Mounting frame and straps provided up to 600 mm (24")⁽²⁾</p> <p>D1H (high precision)⁽³⁾ Mounting frame and straps provided up to 1200 mm (48")⁽²⁾</p> <p>D4H (high precision)⁽³⁾ Mounting frame and straps provided up to 1200 mm (48")⁽²⁾</p> <p>Doppler to 12" with strap kit (not for IP65 (NEMA7)), for up to 121 °C (250 °F)</p> <p>D1H⁽³⁾ High temperature range 104 °C/220 °F HP⁽²⁾</p>	<p>0</p> <p>1</p> <p>2</p> <p>A</p> <p>A</p> <p>B</p> <p>0</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>M</p> <p>N</p> <p>P</p> <p>R</p> <p>S</p> <p>Z</p>	<p>P 1 P</p>

3

Selection and Ordering data	Article No.	Order code
SITRANS FUS1010 (Standard)	7ME353 - - 0	+ K02 + K02 + R02
Sensor for channel 2 (includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.		
No sensor		A
A2 universal	Trackmount and straps provided up to 75 mm (3")	B
B3 universal	Trackmount and straps provided up to 125 mm (5")	C
C3 universal ³⁾	Mounting frame and straps provided up to 300 mm (13")	D
D3 universal ³⁾	Mounting frame and straps provided up to 600 mm (24")	E
E2 universal ³⁾	Mounting frame and straps provided up to 1200 mm (48") ¹⁾	F
C1H (high precision) ³⁾	Mounting frame and straps provided up to 600 mm (24") ²⁾	M
C2H (high precision) ³⁾	Mounting frame and straps provided up to 600 mm (24") ²⁾	N
D1H (high precision) ³⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾	P
D4H (high precision) ³⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾	R
Doppler	to 12" with strap kit (not for IP65 (NEMA7)), for up to 121 °C (250 °F)	S
D1H ³⁾	High temperature range 104 °C/220 °F HP ²⁾	Z
Approvals		
FM/CSA, CE (default)		1
ATEX, CE, C-TICK		2

- ¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4)
- ²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4)
- ³⁾ Made with stainless steel construction.

Standard MLFB product offering represents 4 to 6 weeks delivery time.
For sensor and RTD cables for quick delivery see tables at end of section.



Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 (Standard)	7ME3530-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3531-	
	7ME3533-	
	0 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Number of channels/ultrasonic paths		
Single channel	1	
Dual channel/Dual path	2	
Special: Four channel/Four path (NEMA 4X wall mount and NEMA 7 wall mount explosionproof only)	9	H 1 A
Flowmeter functions and I/O configurations includes graphic or digital display and Reflexor capability for all except IP65 (NEMA 7) compact units		
IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionproof) units		
<ul style="list-style-type: none"> • Standard outputs <ul style="list-style-type: none"> - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x relay C type 	A	
For H1A multi channel option above:		
<ul style="list-style-type: none"> - 4 x 0 ... 10 V - 4 x 4 ... 20 mA - 4 x relay C type 		
<ul style="list-style-type: none"> • Standard outputs with optional input adder <ul style="list-style-type: none"> - UniMass capability with 2 x RTD input (1 x RTD only for H1A multi channel option) - 4 x 4 ... 20 mA analog input 	C	
<ul style="list-style-type: none"> • Extended outputs plus optional inputs (Dual channel only) <ul style="list-style-type: none"> Outputs: <ul style="list-style-type: none"> - 2 x 0 ... 10 V - 2 x 4 ... 20 mA active - 4 x 4 ... 20 mA passive - 2 x 0 ... 5K pulse - 4 x relay C type Inputs: <ul style="list-style-type: none"> - 4 x 4 ... 20 mA - 1 x RTD inputs per channel 	Z	J 1 B
IP65 (NEMA 7) compact explosionproof units		
<ul style="list-style-type: none"> • Standard outputs <ul style="list-style-type: none"> - 1 x 4 ... 20 mA (Loop) and 1 x status (open collector) per channel - 1 x pulse output for single channel units only 	D	
<ul style="list-style-type: none"> • Standard outputs with optional input adder <ul style="list-style-type: none"> - UniMass capability with 1 RTD input (1x RTD only, for H1A multi channel option) - 1 x analog input per channel 	F	
Meter power options		
90 ... 240 V AC	A	
9 ... 36 V DC (except compact NEMA 7)	B	
9 ... 36 V DC negative GND (compact only)	J	
9 ... 36 V DC positive GND (compact only)	K	

Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 (Standard)	7ME3530-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3531-	
	7ME3533-	
	0 -	
Communication options		
VT100 RS 232	0	
Modbus RTU & TCP/IP, HART, BACnet MSTP/BACnet IP, Ethernet IP, Johnson N2	6	
RTD temperature sensor (includes mounting hardware for pipes between 1.5" and 24" outer diameter)		
No RTDs		0
1 x Standard clamp-on RTD		1
2 x Standard clamp-on RTD		2
1 x Submersible clamp-on RTD		3
2 x Submersible clamp-on RTD		4
1 x Insertion style RTD with thermowell and lagging	9	N 1 A
2 x Insertion style RTD with thermowell and lagging	9	N 1 B
Sensor for channel 1 Including pipe mounting tracks for sizes A & B sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness".		
no sensor		A
A2 universal	Trackmount and straps provided up to 75 mm (3")	B
B3 universal	Trackmount and straps provided up to 125 mm (5")	C
C3 universal ⁽³⁾	Mounting frame and straps provided up to 300 mm (13")	D
D3 universal ⁽³⁾	Mounting frame and straps provided up to 600 mm (24")	E
E2 universal ⁽³⁾	Mounting frame and straps provided up to 1200 mm (48") ⁽¹⁾	F

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 (Standard)			SITRANS FUS1010 (Standard)		
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3530-		<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3530-	
	7ME3531-			7ME3531-	
	7ME3533-			7ME3533-	
	0 -			0 -	
Sensor for channel 1 (continued)			Sensor for channel 2		
For the following A1H to D4H sensors, temperature range is -40 °C ... 65 °C			(includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.		
A2H (high precision) Trackmount and straps provided up to 75 mm (3")		H	no sensor		A
A3H (high precision) Trackmount and straps provided up to 75 mm (3")		J	A2 universal Trackmount and straps provided up to 75 mm (3")		B
B1H (high precision) Trackmount and straps provided up to 125 mm (5")		K	B3 universal Trackmount and straps provided up to 125 mm (5")		C
B2H (high precision) Trackmount and straps provided up to 125 mm (5")		L	C3 universal ³⁾ Mounting frame and straps provided up to 300 mm (13")		D
C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		M	D3 universal ³⁾ Mounting frame and straps provided up to 600 mm (24")		E
C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		N	E2 universal ³⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		F
D1H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ²⁾		P	For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
D2H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ²⁾		Q	A2H (high precision) Trackmount and straps provided up to 75 mm (3")		H
D4H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ²⁾		R	A3H (high precision) Trackmount and straps provided up to 75 mm (3")		J
Doppler to 12" with strap kit (not for IP65 (NEMA 7)), for up to 121 °C (250 °F)		S	B1H (high precision) Trackmount and straps provided up to 125 mm (5")		K
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	P 1 A	B2H (high precision) Trackmount and straps provided up to 125 mm (5")		L
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	P 1 B	C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		M
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	P 1 C	C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		N
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			D1H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ^{e2)}		P
B1H (high temperature range HP)	Z	P 1 K	D2H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ²⁾		Q
B2H (high temperature range HP)	Z	P 1 L	D4H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ²⁾		R
C1H (high temperature range HP) ³⁾	Z	P 1 M	Doppler to 12" with strap kit (not for IP65 (NEMA 7)), for up to 121 °C (250 °F)		S
C2H (high temperature range HP) ³⁾	Z	P 1 N			
D1H (high temperature range HP) ²⁾³⁾	Z	P 1 P			
D2H (high temperature range HP) ²⁾³⁾	Z	P 1 Q			
D4H (high temperature range HP) ²⁾³⁾	Z	P 1 R			

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Selection and Ordering data

SITRANS FUS1010 (Standard)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

7ME3530-

7ME3531-

7ME3533-

Sensor for channel 2 (continued)

High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))

Z Q 1 A

High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))

Z Q 1 B

High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))

Z Q 1 C

For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):

B1H (high temperature range HP)

Z Q 1 K

B2H (high temperature range HP)

Z Q 1 L

C1H (high temperature range HP)³⁾

Z Q 1 M

C2H (high temperature range HP)³⁾

Z Q 1 N

D1H (high temperature range HP)²⁾³⁾

Z Q 1 P

D2H (high temperature range HP)²⁾³⁾

Z Q 1 Q

D4H (high temperature range HP)²⁾³⁾

Z Q 1 R

Approvals

FM/CSA, CE

1

ATEX, CE, C-TICK

2

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

³⁾ Made with stainless steel construction.

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Cable assembly for sensors (add for No. of channels)
See "Sensor cable selection chart"

K..

Cable assembly for RTDs (add for No. of RTDs)
See "RTD cable selection chart"

R..

Cable termination kit (for one cable pair)

- Termination for standard, plenum and armored sensor cable

T01

- Termination for submersible sensor cable

T11

- RTD cable termination kit for standard RTD

T21

- RTD cable termination kit for submersible RTD

T31

- Insert RTD cable termination kit

T41

- Cable gland kit

T51

Languages (Meter and Documentation),
English (default) for compact NEMA 7 only

- German

B10

- French

B12

- Spanish

B13

- Italian

B14

Wet flow transfer calibration (priced on request)

6 point calibration 2/water (Price per channel)

- 2SS40 pipe

D01

- 3CS40 pipe

D02

- 4CS40 pipe

D03

- 4SS40 pipe

D04

- 6CS40 pipe

D05

- 6SS40 pipe

D06

- 6CS120 pipe

D07

- 8CS40 pipe

D08

- 8SS40 pipe

D09

- 8CS120 pipe

D10

- 10CS Standard pipe

D11

- 10CS40 pipe

D12

- 10SS40 pipe

D13

- 12CS Standard pipe

D14

- 12CS40 pipe

D15

- 14CS30 pipe

D16

- 14CS40 pipe

D17

- 16CS Standard pipe

D18

- 16CS40 pipe

D19

- 18CS Standard pipe

D20

- 20CS20 pipe

D21

- 20CS30 pipe

D22

- 24CS Standard pipe

D23

- 24CS20 pipe

D24

- 24CS30 pipe

D25

- 30CS Standard pipe

D26

- 36CS Standard pipe

D27

- Other pipe, other liquid, additional points, witness

Y28

Tag name plate

- Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)

Y19

Operating Instructions for SITRANS FUS1010

Article No.

English NEMA 4X wall mount & NEMA 7 wall mount explosionproof

A5E02951520

German NEMA 4X & wall mount NEMA 7 wall mount explosionproof

A5E02951532

NEMA 7 compact explosionproof

CQO:1010XFM-3

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumtenion>

MLFB example

Application example

A clamp-on meter is required for a 12" carbon steel jet fuel line, with a wall thickness of 12.7 mm (0.5"). Meter electronics are to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement.

MLFB Article No.: **7ME3530-2AB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 meter family	7ME3530-2AB00-0QQ1-Z	
IP65 (NEMA 4X) enclosure	0	
Dual Path	2	
Standard I/O option	A	
9 ... 36 V DC power option	B	
RS 232 Standard	0	
No RTD required	0	
Sensor code for path 1	Q	
Sensor code for path 2	Q	
FM approval required	1	
30 m (100 ft) sensor cable for path 1		K03
30 m (100 ft) sensor cable for path 2		K03

Sensor cable (pair) selection chart

Cable length m (ft)	Sensor cable codes for length and type options			
	Standard (PVC jacket)	Submersible (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
	Order code			
6 (20)	K01¹⁾	K11	K21	K31
15 (50)	K02¹⁾	K12¹⁾	K22	K32¹⁾
30 (100)	K03¹⁾	K13¹⁾	K23	K33
46 (150)	K04¹⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06¹⁾	K16	K26	K36

RTD cable (single) selection chart

Cable length m (ft)	RTD cable codes for length and type	
	Standard (teflon wrapped)	Submersible (extruded jacket)
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
	Order code	
6 (20)	R01¹⁾	R11
15 (50)	R02¹⁾	R12
30 (100)	R03¹⁾	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

¹⁾ Standard MLFB for quick delivery

Universal sensor selection chart IP68

Based on pipe size (pipes other than steel)					
Sensor	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
Pipe size		min.	max.	min.	max.
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3 ¹⁾	D	51	305	2	12
D3 ¹⁾	E	203	610	8	24
E2 ¹⁾	F	254	6 096	10	240

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Sensor	Order Code	Pipe wall (mm)		Pipe wall (inch)	
Pipe wall		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H ¹⁾	M	4.06	5.84	0.16	0.23
C2H ¹⁾	N	5.84	8.13	0.23	0.32
D1H ¹⁾	P	8.13	11.18	0.32	0.44
D2H ¹⁾	Q	11.18	15.75	0.44	0.62
D4H ¹⁾	R	15.75	31.75	0.62	1.25

¹⁾ Made with stainless steel construction.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FST020 (Basic)

Overview



SITRANS FST020 offers reliable flow measurement at a much lower cost than other clamp-on ultrasonic flowmeters, with flow rate accuracy of $\pm 0.5\%$ to 1.0% for most applications.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Compact, integral design reduces installation cost
- Wide turn-down ratio
- Optional WideBeam technology ensures high performance.
- ZeroMatic Path automatically sets zero without stopping flow and eliminates zero drift.

Application

SITRANS FST020 is suitable for most clean liquid applications, including the following:

- Water & wastewater industry
 - Potable water
 - Wastewater, influent & effluent
 - Processed sewage, sludge
- Chemical feed industry
 - Sodium hypochlorite
 - Sodium hydroxide
- HVAC & power industries
 - Coolant flow
 - Fuel flow
- Process control
 - Chemicals
 - Pharmaceuticals

The SITRANS FST020 flowmeter is not available with hazardous areas approval.

Design

- IP65 (NEMA 4X) wall mount constructed of polycarbonate
- Single channel versions only

Function

- 2 x16 integral alphanumeric display and 5 key keypad for installation menu and data display
- Pulse rate output
- Communications include VT100 RS 232 with a DB9 connector, Modbus RTU, BACnet MSTP
- Totalizer start/stop and rest control lines.
- Remote PC installation menu
- ZeroMatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site & data logger storage
- Menu language in English, Spanish, German, Italian and French

Technical specifications

Input	
Flow range	± 12 m/s (± 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s) flow rate independent
Digital Inputs	
Totalizer Hold	Optically isolated diode Input voltage: 2 ... 10 V DC
Totalizer Reset	Optically isolated diode Input voltage: 2 ... 10 V DC
Output	
Current	<ul style="list-style-type: none"> • 4 ... 20 mA (Isolated) • externally powered • 10 ... 30 V DC
Relay	<ul style="list-style-type: none"> • Programmable Form C 250 mA • 30 V DC • 3 V A max
Pulse rate ¹⁾	<ul style="list-style-type: none"> • Optically isolated transistor • 10 mA • 30 V DC max
Accuracy	
• 4 ... 20 mA	For velocities ≥ 0.3 m/s (1 ft/s) $\pm 1.0\%$ of flow
• Pulse, relay output	$\pm 0.5\%$... 1.0% of flow
Batch repeatability	$\pm 0.15\%$
Zero Drift	0.1 % of rate; 0.0003 m/s (0.001 ft/s)
Data refresh rate	5 Hz
Transmitter conditions	
Operating temperature	-10 ... +50 °C (14 ... +122 °F)
Storage temperature	-20 ... +60 °C (-4 ... +140 °F)
Degree of protection	IP65 NEMA 4X
Design	
Weight	1.4 kg (3.0 lb)
Dimensions (W x H x D)	175 x 235 x 92 mm (6.89 x 9.25 x 3.62 inch)
Enclosure material	Polycarbonate
Power supply	
	100 ... 240 V AC @ 20 VA or 11.5 ... 28.5 V DC @ 10 W
Certificates and approvals	
Unclassified locations	UL, UL _c
Classified locations	
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	

¹⁾ When used to represent flow rate (PGEN) the frequency can reach as high as 5000 Hz. When used to represent flow total it can reach 50 Hz.

Standard MLFB for quick delivery on SITRANS FST020 (Basic)

Selection and Ordering data	Article No.
SITRANS FST020 (Basic)	7ME357 - 30 - 0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Design	
IP65 (NEMA 4X) wall mount	0
Number of channels/ultrasonic paths	
Single channel	1
Flowmeter functions and I/O configurations	
• With display and 1 additional analog output and SPST relay	H
Meter power options	
100 ... 240 V AC	A
11.5 ... 28.5 V DC, 10 W max	B
Sensor (includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.	
no sensor	A
A2 universal	B
B3 universal	C
C3 universal ²⁾	D
D3 universal ²⁾	E
E2 universal ²⁾	F
For the following A1H to C1H sensors, temperature range is -40 ... 65 °C (-41 ... 150 °F), nominal 21 °C (70 °F)	
C1H (high precision) ²⁾	M
C2H (high precision) ²⁾	N
D1H (high precision) ²⁾	P
D4H (high precision) ²⁾	R
Sensor cables	
No sensor cable	A
6 m (20 ft) PVC Jacket (1 pr)	B
15 m (50 ft) PVC Jacket (1 pr)	C
30 m (100 ft) PVC Jacket	D
46 m (150 ft) PVC Jacket	E
91 m (300 ft) PVC Jacket	G
Approvals	
UL, UL _C , CE, C-TICK	0
Standard MLFB offering represents 2 to 3 weeks delivery time for quantities under 5.	

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

²⁾ Made of stainless steel construction.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FST020 (Basic)

Selection and Ordering data

Article No. Ord. code

SITRANS FST020 (Basic) IP65 (NEMA 4x) **7ME3570-**

3 0 - 0

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Number of channels/ultrasonic paths

Single channel

1

Flowmeter functions and I/O configurations

- With display, keypad, 1x 4 ... 20 mA, 1x relay, 1x pulse/frequency, 2x digital input, VT100 RS232, Modbus RTU, BACnet MSTP

H

Meter power options

100 ... 240 V AC

11.5 ... 28.5 V DC

A
B

Sensor for channel 1¹⁾

Including pipe mounting tracks for Sizes A & B universal sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E universal sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness

no sensor

A2 universal Trackmount and straps provided up to 75 mm (3")

A

B3 universal Trackmount and straps provided up to 125 mm (5")

B

C3 universal²⁾ Mounting frame and straps provided up to 330 mm (13")

C

D3 universal²⁾ Mounting frame and straps provided up to 600 mm (24")

D

E2 universal²⁾ Mounting frame and straps provided up to 1200 mm (48")

E

For the following A2H to D4H transducers, temperature range is -40 ... 65 °C (-41 ... 150 °F), nominal 21 °C (70 °F)

A2H (high precision) Trackmount and straps provided up to 75 mm (3")

F

A3H (high precision) Trackmount and straps provided up to 75 mm (5")

H

B1H (high precision) Trackmount and straps provided up to 125 mm (5")

J

B2H (high precision) Trackmount and straps provided up to 125 mm (5")

K

C1H (high precision)²⁾ up to 600 mm (24") with mounting hardware

L

C2H (high precision)²⁾ up to 600 mm (24") with mounting hardware

M

D1H (high precision)²⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾

N

D2H (high precision)²⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾

P

D4H (high precision)²⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾

Q

R

Selection and Ordering data

Article No. Ord. code

SITRANS FST020 (Basic) IP65 (NEMA 4x) **7ME3570-**

3 0 - 0

High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1 to 8 inch diam.))

Z P 1 A

High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. 6 to 24 inch diam.))

Z P 1 B

High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (16 to 48 inch diam.))

Z P 1 C

Sensor cables (pair)

No sensor cable

A

6 m (20 ft) PVC Jacket

B

15 m (50 ft) PVC Jacket

C

30 m (100 ft) PVC Jacket

D

46 m (150 ft) PVC Jacket

E

61 m (200 ft) PVC Jacket

F

91 m (300 ft) PVC Jacket

G

6 m (20 ft) Plenum rated (Teflon jacket)

H

15 m (50 ft) Plenum rated (Teflon jacket)

J

30 m (100 ft) Plenum rated (Teflon jacket)

K

46 m (150 ft) Plenum rated (Teflon jacket)

L

61 m (200 ft) Plenum rated (Teflon jacket)

M

91 m (300 ft) Plenum rated (Teflon jacket)

N

Approvals

UL, UL_C, CE, C-TICK

0

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42"). For pipes larger than 1050 mm (42") purchase also, spare part 7ME3960-0MS40 (1012BN-4)

²⁾ Made of stainless steel construction.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Cable termination kit (for one cable pair) • Sensor cable termination for standard and plenum cable	T01
Wet flow transfer calibration (priced on request) 6 point calibration 2/water (Price per channel)	
• 2SS40 pipe	D01
• 3CS40 pipe	D02
• 4CS40 pipe	D03
• 4SS40 pipe	D04
• 6CS40 pipe	D05
• 6SS40 pipe	D06
• 6CS120 pipe	D07
• 8CS40 pipe	D08
• 8SS40 pipe	D09
• 8CS120 pipe	D10
• 10CS Standard pipe	D11
• 10CS40 pipe	D12
• 10SS40 pipe	D13
• 12CS Standard pipe	D14
• 12CS40 pipe	D15
• 14CS30 pipe	D16
• 14CS40 pipe	D17
• 16CS Standard pipe	D18
• 16CS40 pipe	D19
• 18CS Standard pipe	D20
• 20CS20 pipe	D21
• 20CS30 pipe	D22
• 24CS Standard pipe	D23
• 24CS20 pipe	D24
• 24CS30 pipe	D25
• 30CS Standard pipe	D26
• 36CS Standard pipe	D27
• Other pipe, other liquid, additional points, witness	Y28
Tag name plate • Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19

MLFB example

Application example

A basic clamp-on meter is required for a DN 150 (6" schedule 40) carbon steel waste water line, with a pipe wall thickness of 7.1 mm (0.28"). Meter electronics are to be located in an instrumentation shed with available AC power. 36 m (120 ft) of sensor cable is needed to reach pipe location.

MLFB Article No.: **7ME3570-1HA30-ONE0**

Selection and Ordering data	Article No.	Ord. code
SITRANS FST020 meter family	7ME357	30-000
IP65 (NEMA 4X) enclosure	0	
Single channel	1	
Standard I/O option	H	
100 ... 240 V AC power option	A	
Sensor code for channel 1	N	
46 m (150 ft) sensor cable	E	

Selection and Ordering data	Order code
Operating Instructions for SITRANS FST020	
English NEMA 4X	A5E03086487
German NEMA 4X	A5E03086488
This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.	
All literature is also available for free at: http://www.siemens.com/flowdocumentation	

Universal sensor selection chart IP68

Pipe size	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
		min.	max.	min.	max.
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3 ¹⁾	D	51	305	2	12
D3 ¹⁾	E	203	610	8	24
E2 ¹⁾	F	254	6096	10	249

High precision sensor selection chart IP68

Pipe Wall	Order Code	Pipe Wall [mm]		Pipe Wall [inch]	
		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H ¹⁾	M	4.06	5.84	0.16	0.23
C2H ¹⁾	N	5.84	8.13	0.23	0.32
D1H ¹⁾	P	8.13	11.18	0.32	0.44
D2H ¹⁾	Q	11.18	15.75	0.44	0.62
D4H ¹⁾	R	15.75	31.75	0.62	1.25

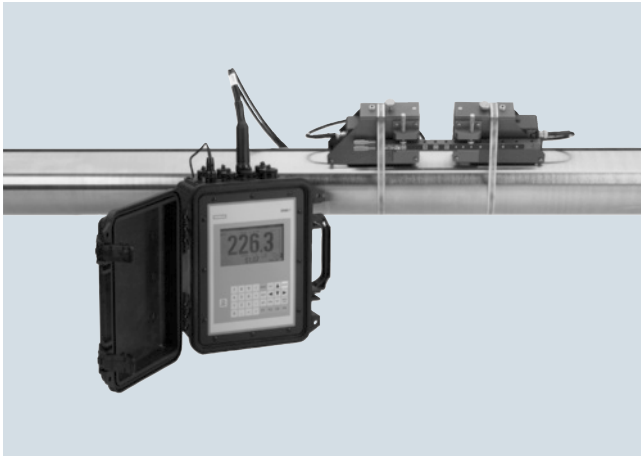
¹⁾ Made of stainless steel construction.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Overview



SITRANS FUP1010 clamp-on non-intrusive ultrasonic flow transmitter offers maximum versatility plus battery power for portable field use. It can operate in either WideBeam transit time or reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUP1010 is available in single and dual channel or dual path configurations, with IP67 weatherproof enclosure.

Benefits

- Battery power facilitates field use; the meter is easily transported from one installation to another – saving time for surveys, monitoring and temporary installations
- Weatherproof enclosure can be used outdoors and left in place without concern for rain damage
- Rugged plastic case enables it to withstand rough treatment that would destroy most other meters
- Versatility - there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel models minimizes total cost
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Note that the SITRANS FUP1010 flow transmitter is not available with hazardous area approvals

Application

SITRANS FUP1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot and cold water systems
 - Thermal energy rate and total
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

Design

- IP67 Weatherproof/Impact resistant enclosure constructed of mineral reinforced copolymer polypropylene
 - Single channel
 - Dual channel/dual path

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS 232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options
- VT100 RS 232 communications

Technical specifications

Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Inputs, single channel	<ul style="list-style-type: none"> • Current: 20 mA DC • Temperature: 4 wire 1 kΩ RTD
Output	
Outputs	<ul style="list-style-type: none"> • Current: 20 mA DC (1 kΩ at 30 V DC) • Voltage: 10 V DC (5 kΩ minimum) • Status Alarm: SPDT Relays • Pulse rate: 5 kHz • VT100 RS 232
Accuracy	
Accuracy	± 0.5 % ... 2 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.006 m/s (± 0.005 ... 0.02 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Rated operation conditions	
Degree of protection	IP67
<ul style="list-style-type: none"> • Weatherproof/impact resistant 	
Liquid temperature	-40 ... +120 °C (-40 ... +250 °F)
<ul style="list-style-type: none"> • Standard 	
<ul style="list-style-type: none"> • Optional 	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
Power	Internal rechargeable battery
Battery operation	7 hours
Indication and operation	
Data logger memory	1 MByte
Site storage memory	50 sites minimum
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
Unclassified locations	UL ULc
Classified locations	
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Standard MLFB for quick delivery on SITRANS FUP1010 Portable (excluding energy)

Selection and Ordering data	Article No.	Order Code
SITRANS FUP1010 (Portable)	7ME3510-	
• IP67 weatherproof battery powered		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Number of channels/ultrasonic paths		
Single channel	1	
Dual channel/Dual path	2	
Standard flowmeter types and I/O configurations		
• Standard I/O		
- 2 x 4 ... 20 mA analog in		
- 2 x RTD input		
Sensor cables		
No sensor cable		A
1 x PVC Jacket cable, length 6 m/20 ft ²⁾		B
2 x PVC Jacket cable, length 6 m/20 ft ²⁾		C
1 x PVC Jacket cable, length 15 m/50 ft ²⁾		D
2 x PVC Jacket cable, length 15 m/50 ft ²⁾		E
RTD temperature Sensor (Mounting hardware & cable included)		
No RTDs		0
1 x standard clamp-on RTD, 6 m/20 ft cable ¹⁾		5
2 x standard clamp-on RTD with 6 m/20 ft cable ¹⁾		6
1 x standard clamp-on RTD with 15 m/50 ft cable ¹⁾		7
2 x standard clamp-on RTD with 15 m/50 ft cable ¹⁾		8
Battery charger options		
No battery charger		0
Charger Type A for Europe (CEE7/7)		1
Charger Type G for U.S. (NEMA 5-15P)		5
Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.		
no sensor		A
A2 universal Trackmount and straps provided up to 75 mm (3")		B
B3 universal Trackmount and straps provided up to 125 mm (5")		C
C3 universal Mounting frame and straps provided up to 300 mm (13")		D
D3 universal Mounting frame and straps provided up to 600 mm (24")		E
E2 universal Mounting frame and straps provided up to 600 mm (24")		F
C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		M
C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		N
D1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		P
D4H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		R
Doppler to 12" with strap kit (not for IP65 (NEMA 7))		S
D1H ³⁾ High temperature range 104 °C/220 °F HP ²⁾		Z P 1 P

Selection and Ordering data	Article No.	Order Code
SITRANS FUP1010 (Portable)	7ME3510-	
• IP67 weatherproof battery powered		
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.		
no sensor		A
A2 universal Trackmount and straps provided up to 75 mm (3")		B
B3 universal Trackmount and straps provided up to 125 mm (5")		C
C3 universal Mounting frame and straps provided up to 300 mm (13")		D
D3 universal Mounting frame and straps provided up to 600 mm (24")		E
E2 universal Mounting frame and straps provided up to 600 mm (24")		F
C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		M
C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		N
D1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		P
D2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")		Q
Doppler to 12" with strap kit (not for IP65 (NEMA 7))		S
D1H ³⁾ High temperature range 104 °C/220 °F HP ²⁾		Z Q 1 P
Approvals: No options (UL, ULc, CE by default)		
Standard MLFB product offering represents 4 to 6 weeks delivery time		
¹⁾ -40 ... +200 °C (-40 ... +392 °F)		
²⁾ -40 ... +80 °C (-40 ... +176 °F)		
³⁾ Made of stainless steel constructions.		

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FUP1010 (Portable) <ul style="list-style-type: none"> IP67 weatherproof battery powered 	7ME3510-		SITRANS FUP1010 (Portable) <ul style="list-style-type: none"> IP67 weatherproof battery powered 	7ME3510-	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Number of channels/ultrasonic paths Single channel Dual channel/Dual path	1 2		Sensor for channel 1 Including pipe mounting tracks for sizes A & B sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness.		
Standard flowmeter types and I/O configurations <ul style="list-style-type: none"> Standard I/O <ul style="list-style-type: none"> Reflexor capable Graphic display 2 x 0 ... 10 V 2 x 4 ... 20 mA 2 x pulse outputs 4 x status logic 2 x 4 ... 20 mA analog in 1 x RTD per channel 	C		no sensor A2 universal Trackmount and straps provided up to 75 mm (3") B3 universal Trackmount and straps provided up to 125 mm (5") C3 universal Mounting frame and straps provided up to 300 mm (13") D3 universal Mounting frame and straps provided up to 600 mm (24") E2 universal Mounting frame and straps provided up to 600 mm (24")	A B C D E	
Sensor cables (select proper quantity of active channels) No sensor cable <u>IP67 (weatherproof) only</u> 1 x PVC-jacket, length 6 m (20 ft) (for IP67 NEMA 6) ²⁾ 2 x PVC-jacket, length 6 m (20 ft) (for IP67 NEMA 6) ²⁾ 1 x PVC-jacket, length 15 m (50 ft) (for IP67 NEMA 6) ²⁾ 2 x PVC-jacket, length 15 m (50 ft) (for IP67 NEMA 6) ²⁾	A B C D E		For the following A2H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F): A2H (high precision) Trackmount and straps provided up to 75 mm (3") A3H (high precision) Trackmount and straps provided up to 75 mm (3") B1H (high precision) Trackmount and straps provided up to 125 mm (5") B2H (high precision) Trackmount and straps provided up to 125 mm (5") C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24") C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24") D1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24") D2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24") D4H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")	H J K L M N P Q R	
RTD temperature sensor (for type 3 meter only, mounting hardware and cable included) No RTDs <u>IP67 (weatherproof) only</u> 1 x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable ¹⁾ 2 x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable ¹⁾ 1 x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable ¹⁾ 2 x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable ¹⁾	0 5 6 7 8		Doppler to 12" with chain kit High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.)) High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.)) High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	S Z Z Z	P 1 A P 1 B P 1 C
Battery charger options no battery charger Charger Type A for Europe (CEE7/7) Charger Type C for Australia (AS3112) Charger Type D for U.K. (BS1363) Charger Type J for Japan (JIS8303) Charger Type G for U.S. (NEMA 5-15P) Charger Type L for Switzerland (SEV1011)	0 1 2 3 4 5 6				

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Selection and Ordering data

SITRANS FUP1010 (Portable)

- IP67 weatherproof battery powered

Article No. Ord. code

7ME3510-

- 0 0

Sensor for channel 1 (continued)

For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):

B1H (high temperature range HP)	Z	P 1 K
B2H (high temperature range HP)	Z	P 1 L
C1H (high temperature range HP)	Z	P 1 M
C2H (high temperature range HP)	Z	P 1 N
D1H (high temperature range HP)	Z	P 1 P
D2H (high temperature range HP)	Z	P 1 Q
D4H (high temperature range HP)	Z	P 1 R

Sensor for channel 2

(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed)
See "Sensor selection charts" for specifications.

no sensor	A
A2 universal Trackmount and straps provided up to 75 mm (3")	B
B3 universal Trackmount and straps provided up to 125 mm (5")	C
C3 universal Mounting frame and straps provided up to 300 mm (13")	D
D3 universal Mounting frame and straps provided up to 600 mm (24")	E
E2 universal Mounting frame and straps provided up to 600 mm (24")	F

For the following A2H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):

A2H (high precision) Trackmount and straps provided up to 75 mm (3")	H
A3H (high precision) Trackmount and straps provided up to 75 mm (3")	J
B1H (high precision) Trackmount and straps provided up to 125 mm (5")	K
B2H (high precision) Trackmount and straps provided up to 125 mm (5")	L
C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")	M
C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")	N
D1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")	P
D2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")	Q
D4H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24")	R
Doppler to 12" with chain kit	S

Selection and Ordering data

SITRANS FUP1010 (Portable)

- IP67 weatherproof battery powered

Article No. Ord. code

7ME3510-

- 0 0

Sensor for channel 2 (continued)

High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))

Z Q 1 A

High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))

Z Q 1 B

High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))

Z Q 1 C

For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):

B1H (high temperature range HP)	Z	Q 1 K
B2H (high temperature range HP)	Z	Q 1 L
C1H (high temperature range HP)	Z	Q 1 M
C2H (high temperature range HP)	Z	Q 1 N
D1H (high temperature range HP)	Z	Q 1 P
D2H (high temperature range HP)	Z	Q 1 Q
D4H (high temperature range HP)	Z	Q 1 R

Approvals: No options (UL, ULc, CE by default)

¹⁾ -40 ... +200 °C (-40 ... +392 °F)

²⁾ -40 ... +80 °C (-40 ... +176 °F)

³⁾ Made of stainless steel constructions.

Selection and Ordering data

Article No.

Operating Instructions for SITRANS FUP1010

English IP67 Weatherproof

A5E02951522

German IP67 Weatherproof

A5E02951534

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Languages (Meter and Documentation), English (default). All languages now come standard in all flowmeters

Wet flow transfer calibration (priced on request)

6 point calibration 2/water (Price per channel)

- 2SS40 pipe
 - 3CS40 pipe
 - 4CS40 pipe
 - 4SS40 pipe
 - 6CS40 pipe
 - 6SS40 pipe
 - 6CS120 pipe
 - 8CS40 pipe
 - 8SS40 pipe
 - 8CS120 pipe
 - 10CS Standard pipe
 - 10CS40 pipe
 - 10SS40 pipe
 - 12CS Standard pipe
 - 12CS40 pipe
 - 14CS30 pipe
 - 14CS40 pipe
 - 16CS Standard pipe
 - 16CS40 pipe
 - 18CS Standard pipe
 - 20CS20 pipe
 - 20CS30 pipe
 - 24CS Standard pipe
 - 24CS20 pipe
 - 24CS30 pipe
 - 30CS Standard pipe
 - 36CS Standard pipe
 - Other pipe, other liquid, additional points, witness
- 1x Insertion RTD with thermowell and lagging
2x Insertion RTD with thermowell and lagging
- Tag name plate
- Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)

D01
D02
D03
D04
D05
D06
D07
D08
D09
D10
D11
D12
D13
D14
D15
D16
D17
D18
D19
D20
D21
D22
D23
D24
D25
D26
D27
Y28
M1A
M1B
Y19

MLFB example**Application example**

A general survey portable flowmeter is required for pipes sizes ranging from 76 ... 500 mm (3" ... 20") with both cast iron and steel material. Doppler may be required as liquid may be moderately aerated.

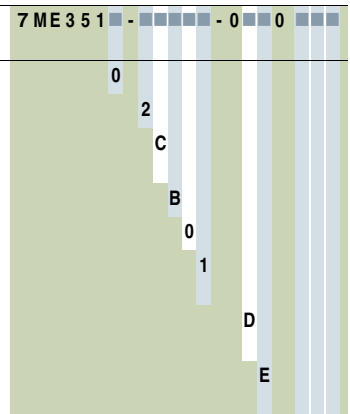
Requires language support for German.

MLFB Article No.: **7ME3510-2CB01-0DE0-Z**
B10

Selection and Ordering data

Article No.

Ord. code

SITRANS FUP1010 meter family

IP67 weatherproof

Dual channel

Portable I/O with Doppler capable, temperature

1 x PVC-Jacket, length 6 m (20 ft)

No RTDs required

Charger Type A for Europe (CEE7/7)

Sensor for DN 50 ... DN 300 (2" ... 12") pipes

Sensor for DN 200 ... DN 600 (8" ... 24") pipes

Universal sensor selection chart IP68**Based on pipe size (all pipe materials)**

Pipe size	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
		min.	max.	min.	max.
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3	D	51	305	2	12
D3	E	203	610	8	24
E2	F	254	6096	10	249

High precision sensor selection chart IP68**Based on pipe wall thickness (steel pipes only)**

Pipe Wall	Order Code	Pipe Wall [mm]		Pipe Wall [inch]	
		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H ¹⁾	M	4.06	5.84	0.16	0.23
C2H ¹⁾	N	5.84	8.13	0.23	0.32
D1H ¹⁾	P	8.13	11.18	0.32	0.44
D2H ¹⁾	Q	11.18	15.75	0.44	0.62
D4H ¹⁾	R	15.75	31.75	0.62	1.25

¹⁾ Made of stainless steel constructions.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010

Overview



There are two check kits available: SITRANS FUP1010 Water check metering kit for water and wastewater applications, and SITRANS FUP1010 Liquid check metering kit for liquid applications other than water. The kits have been developed especially for verifying the accuracy and performance of any brand or type of flowmeter. They can be used to verify the performance of meters based on any existing flow measurement principle: orifice, electromagnetic, ultrasonic, rotary piston, coriolis, etc. In addition, they measure practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids.

Benefits

- Performance check or verification of any type or brand of flowmeter
- Field use is facilitated by meter portability and 7 hours or normal battery operation.
- Weatherproof enclosure withstands even severe weather conditions
- 1 MByte datalogger capability downloadable to PC via included RS 232 cable
- Fast, easy and cost-efficient on-site measurement of any convoluted pipe from 20 to 1200 mm (0.75 to 48")
- Delivered as an all inclusive kit in a sturdy rolling case that holds all the equipment needed to conduct performance and verification tests (cables, multiple sensors, flow transmitter etc.)

Application

The SITRANS FUP1010 Water and Liquid Check Metering Kits measure practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. This basic feature enables the performance check and verification of existing meters used in various water and wastewater applications such as:

Raw Water and sewage

- Potable water
- Chemicals
- Effluent and sludges
- Process control
- Batching
- Rate indication
- Hot and cold water systems

Design

- IP67 weatherproof/impact resistant enclosure, constructed of mineral reinforced copolymer polypropylene
- Single channel

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS 232 outputs (see Technical specification section for details)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

Technical specifications

Pipe sizes	
• Water Check Metering Kit	50 ... 1050 mm (2 ... 42")
• Liquid Check Metering Kit	20 ... 1200 mm (0.75 ... 48")
Accuracy	±0.5 % ... ±2.0 % of flow rate
Flow range	12 m/s (40 ft/s) bidirectional
Media temperature	-40 ... +104 °C (-40 ... 220 °F)
Enclosure ratings	IP67 (Weatherproof)

See page 3/343 for complete technical specifications

Certificates and approvals

Unclassified locations	UL ULc
Classified locations	
CE	EMV Directive 2004/108/EC ATEX Directive 94/9/EC

Selection and Ordering data	Article No.
SITRANS FUP1010 Water Check Metering Kit	CQO:FUPW-WWKIT
<i>Content of delivery</i>	
1 Single channel portable submersible flow transmitter	
1 pair Universal sensor C3 ¹⁾	
1 pair Universal sensor E2 ¹⁾	
1 pair Doppler sensors	
1 pair Mounting Ezclamp (2 mounting Ezclamp chains)	
1 Ladder chain	
1 Battery charger	
1 pair 20 ft sensor cable	
1 Cable - 1010WP/WDP to PC	
1 PinStop spacer bar (universal)	
1 Flow case	
1 Flowmeter manual	
1 Laminated card set	
1 Certificate of intrinsic calibration	

Selection and Ordering data	Article No.
SITRANS FUP1010 Liquid Check Metering Kit	CQO:FUS-LIQKIT
<i>Content of delivery</i>	
1 Single channel portable submersible transmitter	
1 pair Universal sensor B3	
1 pair Universal sensor C3 ¹⁾	
1 pair Universal sensor D3 ¹⁾	
1 pair Universal sensor E2 ¹⁾	
1 pair Doppler sensors	
1 pair Sensor cables 6m (20 ft)	
1 pair Mounting track	
1 pair Mounting Ezclamp	
1 Spacer bar (portable)	
1 Ladder chain	
1 Battery charger	
1 RS 232 cable for PC connection	
1 Flow case	
1 Clamp-on flowmeter manual CD	
1 Flowmeter manual	
1 Laminated card set	
1 Certificate of intrinsic calibration	

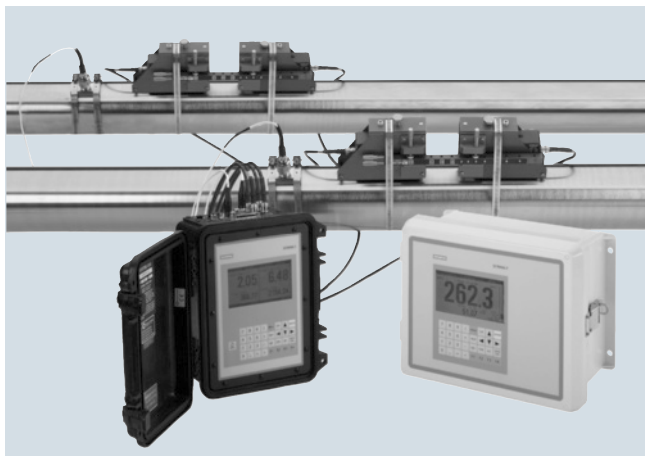
¹⁾ Made of stainless steel constructions.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Overview



SITRANS FUE1010 is a highly accurate clamp-on non-intrusive ultrasonic flow transmitter for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems.

SITRANS FUE1010 is available in single and dual channel or dual path configurations, with your choice of IP65 (NEMA 4X) dedicated wall mount or IP40 (NEMA 1) portable enclosures.

Benefits

- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel/dual path or dual mode operation:
 - Dual channel operation reduces the cost for the system on a per channel measurement basis and permits measuring hot and chilled water lines at the same time
 - Dual path capability insures high flow measurement accuracy on installations with less than desirable piping runs
- Ability to operate in either Wide-Beam Transit-time or reflexor (Doppler) mode for applications with high aeration
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

SITRANS FUE1010 is ideally suited to thermal energy/power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

Design

SITRANS FUE1010 is available in three configurations:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiber-glass reinforced polyester with stainless steel hardware and polyester keypad
 - Single channel
 - Dual channel/dual path
- IP40 (NEMA 1) Portable impact resistant enclosure constructed of mineral reinforced copolymer polypropylene
 - Dual channel/dual path

Function

- Flow transmitter has an integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 $^{\circ}\text{C}$ (0.02 $^{\circ}\text{F}$)
- Temperature is factory calibrated with built-in field calibrator.
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Reverse flow and empty pipe detection
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
 - Cooling load (kW/ton)
 - Coefficient of performance (COP)
 - Energy efficiency ratio (EER)
- Optional current inputs
- Digital communication options:
 - HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 (IP65, NEMA 4X only)
 - VT100 RS 232 serial communications (Portable and NEMA 4X)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

Technical specifications

Input	
Flow range	0 ... 12 m/s (0 ... 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s)
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Inputs per channel	<ul style="list-style-type: none"> • Current: 20 mA • Temperature: 4 wire 1 kΩ RTD • Totalizer commands (clear/hold)
Output	
Standard outputs	<ul style="list-style-type: none"> • Current: 20 mA DC (1 kΩ at 30 V DC) • Voltage: 10 V DC (5 kΩ minimum) • Status Alarm: SPDT Relays • Form C relays • Pulse rate: 5 kHz • VT100 RS 232
Optional outputs	<ul style="list-style-type: none"> • Expanded I/Os (4 additional 4 ... 20 mA outputs) with form C relays • HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 (IP65, NEMA 4X only)
Accuracy	
Accuracy	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Rated operation conditions	
Degree of protection	Wall mount enclosure: IP65 (NEMA 4X) Portable enclosure: IP40 (NEMA 1)
Liquid temperature	<ul style="list-style-type: none"> • Standard -40 ... +120 °C (-40 ... +250 °F) • Optional -40 ... +230 °C (-40 ... +450 °F)
Sensor temperature	<ul style="list-style-type: none"> • Standard -40 ... +120 °C (-40 ... +250 °F) • Optional -40 ... +232 °C (-80 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
Dedicated	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC
Portable enclosure	Rechargeable battery

Indication and operation	
Data logger memory	1 Mbyte of storage
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
Dedicated enclosures	
FM and CSA ratings	<ul style="list-style-type: none"> • Transmitter NI Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
Portable enclosures	UL ULc
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Standard MLFB for quick delivery on SITRANS FUE1010 (Energy system)

Selection and Ordering data	Article No.	Order code
SITRANS FUE1010 (Energy)	7ME350	- - 0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Design		
<u>Dedicated</u>		
IP65 (NEMA 4X) wall mount	0	K02 + K02 + R02
<u>Portable</u>		
IP40 (NEMA 1) Battery powered	2	K01 + K01 + R01
Number of channels/ultrasonic paths		
<u>Dedicated meters</u>		
Single channel	1	
<u>Portable meters</u>		
Dual channel/Dual path	4	
Flowmeter functions and I/O configurations		
<ul style="list-style-type: none"> • Portable Standard I/O <ul style="list-style-type: none"> - Reflexor capability - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x status logic - Energy efficiency COP/EER output - 2 x 4 ... 20 mA analog input • Dedicated Standard I/O <ul style="list-style-type: none"> - Reflexor capability - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x relay C type - Energy efficiency COP/EER output - 2 x 4 ... 20 mA analog input 	C	
	F	
Meter power options		
90 ... 240 V AC (Dedicated only)	A	
Charger Type A for Europe (CEE/77)	C	
Charger Type K for U.S. (NEMA 5-15P)	G	
No charger	J	
Communication options		
VT100 RS 232	0	
RTD temperature sensor pair		
(includes mounting hardware for pipes above 1.5" outer diameter)		
No RTDs (Note: Temperature input is required for Energy systems)	0	
1 x Pair Std clamp-on RTD (NEMA 4X only) ³⁾	1	
2 x Pair Std clamp-on RTD (For Dual Channel NEMA 4X only) ³⁾	2	
1 x Pair Std clamp-on RTD (For NEMA 12 Portable) ³⁾	3	
2 x Pair Std clamp-on RTD (For Dual Channel NEMA 1 Portable) ³⁾	4	
1 x Insertion RTD with Thermowell and Lagging ³⁾	9	M1A
2 x Insertion RTD with Thermowell and Lagging ³⁾	9	M1B
Sensor for channel 1		
(includes pipe mounting kit and spacer bar for indicated max. OD listed)		
See "Sensor selection charts" for specifications.		
no sensor		A
A2 universal	Trackmount and straps provided up to 75 mm (3")	B
B3 universal	Trackmount and straps provided up to 125 mm (5")	C
C3 universal ⁵⁾	Mounting frame and straps provided up to 300 mm (13")	D
D3 universal ⁵⁾	Mounting frame and straps provided up to 600 mm (24")	E
E2 universal ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ¹⁾⁴⁾	F
C1H (high precision) ⁵⁾	Mounting frame and straps provided up to 600 mm (24") ⁴⁾	M
C2H (high precision) ⁵⁾	Mounting frame and straps provided up to 600 mm (24") ⁴⁾	N
D1H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ⁴⁾	P
D2H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ⁴⁾	Q
Doppler	to 12" with strap kit (not for IP65 (NEMA7)), for up to 121 °C (250 °F)	S
D1H ⁵⁾	High temperature range 104 °C/220 °F HP ²⁾	Z
		P1P

Selection and Ordering data	Article No.	Order code
SITRANS FUE1010 (Energy)	7ME350 - - 0	+ +
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.		
no sensor		A
A2 universal Trackmount and straps provided up to 75 mm (3")		B
B3 universal Trackmount and straps provided up to 125 mm (5")		C
C3 universal ⁵⁾ Mounting frame and straps provided up to 300 mm (13")		D
D3 universal ⁵⁾ Mounting frame and straps provided up to 600 mm (24")		E
E2 universal ⁵⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾⁴⁾		F
C1H (high precision) ⁵⁾ Mounting frame and straps provided up to 600 mm (24") ⁴⁾		M
C2H (high precision) ⁵⁾ Mounting frame and straps provided up to 600 mm (24") ⁴⁾		N
D1H (high precision) ⁵⁾ Mounting frame and straps provided up to 1200 mm (48") ⁴⁾		P
D4H (high precision) ⁵⁾ Mounting frame and straps provided up to 1200 mm (48") ⁴⁾		R
Doppler to 12" with strap kit (not for IP65 (NEMA7)), for up to 121 °C (250 °F)		S
D1H ⁵⁾ High temperature range 104 °C/220 °F HP ²⁾		Z Q1P
Approvals UL/Portable		0
FM, CSA, CE, Dedicated		1

- 1) Supplied spacer bar supports pipes up to 1050 mm (42 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-OMS40 (1012BN-4)
- 2) Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-OMS40 (1012BN-4)
- 3) Requires two R** cables per one RTD pair
- 4) 600 mm (24") for portable systems only
- 5) Made with stainless steel constructions.

Standard MLFB product offering represents 4 to 6 weeks delivery time
For sensor and RTD cables for quick delivery see tables at end of section



Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

3

Selection and Ordering data Article No. Ord. code

SITRANS FUE1010 (Energy)

- Dedicated IP65 (NEMA 4X) wall mount
- Portable IP40 (NEMA 1) Battery powered

7ME3500-

7ME3502-

0

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Number of channels/ultrasonic paths
Dedicated meter

Dedicated meter

Single channel

1

Dual channel/Dual path

2

Portables

Dual channel/Dual path

4

Flowmeter functions and I/O configurations

- Portable Standard I/O
 - Reflexor capability
 - Graphic display
 - 2 x 0 ... 10 V
 - 2 x 4 ... 20 mA
 - 2 x pulse output
 - 4 x status logic
 - Energy efficiency COP/EER output
 - 2 x 4 ... 20 mA analog input

C

- Dedicated Standard I/O
 - Reflexor capability
 - Graphic display
 - 2 x 0 ... 10 V
 - 2 x 4 ... 20 mA
 - 2 x pulse output
 - 4 x relay C type
 - Energy efficiency COP/EER output
 - 2 x 4 ... 20 mA analog input

F

- Extended output adder plus standard inputs (4 additional 4 ... 20 mA outputs) and form C relay

Z

J 1 B

Meter power options

90 ... 240 V AC (Dedicated only)

A

9 ... 36 V DC (Dedicated only)

B

Charger Type A for Europe (CEE7/7)

C

Charger Type C for Australia (AS3112)

D

Charger Type D for U.K. (BS1363)

E

Charger Type J for Japan (JIS8303)

F

Charger Type K for U.S. (NEMA 5-15P)

G

Charger Type L for Switzerland (SEV1011)

H

No Charger

J

External 4 hours battery with US plug for Portable

Z

K 1 A

External 4 hours battery with European plug for Portable

Z

K 1 B

Communication options

VT100 RS 232

0

7ME3500 only;

3

HART, BACnet MSTP/BACnet IP,

Modbus RTU/TCPIP, Ethernet IP, Johnson N2

Selection and Ordering data Article No. Ord. code

SITRANS FUE1010 (Energy)

- Dedicated IP65 (NEMA 4X) wall mount
- Portable IP40 (NEMA 1) Battery powered

7ME3500-

7ME3502-

0

RTD temperature sensor

(includes mounting hardware for pipes above 1.5" outer diameter)

No RTDs (Note: temperature input is required for energy system)

0

1 x pair standard clamp-on RTD (NEMA 4X only)³⁾

1

2 x pair standard clamp-on RTD (for dual channel NEMA 4X only)³⁾

2

1 x pair standard clamp-on RTD (NEMA 1 Portable)³⁾

3

2 x pair standard clamp-on RTD (for dual channel NEMA 1 Portable)³⁾

4

1 x Insertion style RTD with thermowell and lagging³⁾

9

M 1 A

2 x Insertion style RTD with thermowell and lagging³⁾

9

M 1 B

Sensor for channel 1

Including pipe mounting tracks for sizes A & B sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness.

No sensor

A

A2 universal Trackmount and straps provided up to 75 mm (3")

B

B3 universal Trackmount and straps provided up to 125 mm (5")

C

C3 universal⁵⁾ Mounting frame and straps provided up to 300 mm (13")

D

D3 universal⁵⁾ Mounting frame and straps provided up to 600 mm (24")

E

E2 universal⁵⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾⁴⁾

F

For the following A1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):

For other temperature ranges please see spare parts list.

A2H (high precision) Trackmount and straps provided up to 75 mm (3")

H

A3H (high precision) Trackmount and straps provided up to 75 mm (3")

J

B1H (high precision) Trackmount and straps provided up to 125 mm (5")

K

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS FUE1010 (Energy)				SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount		7ME3500-		• Dedicated IP65 (NEMA 4X) wall mount		7ME3500-	
• Portable IP40 (NEMA 1) Battery powered		7ME3502-		• Portable IP40 (NEMA 1) Battery powered		7ME3502-	
Sensor for channel 1 (continued)				Sensor for channel 2 (continued)			
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		L	For the following A1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):			
C1H (high precision) ⁵⁾	Mounting frame and straps provided up to 600 mm (24") ⁴⁾		M	A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		H
C2H (high precision) ⁵⁾	Mounting frame and straps provided up to 600 mm (24") ⁴⁾		N	A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		J
D1H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾⁴⁾		P	B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		K
D2H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾⁴⁾		Q	B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		L
D4H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾⁴⁾		R	C1H (high precision) ⁵⁾	Mounting frame and straps provided up to 600 mm (24") ⁴⁾		M
Doppler	to 12" with strap kit, for up to 121 °C (250 °F)		S	C2H (high precision) ⁵⁾	Mounting frame and straps provided up to 600 mm (24") ⁴⁾		N
High temperature sensor size 2 for up to 230 °C (446 °F) (30 ... 200 mm diam. (1.18 ... 7.67 inch diam.))		Z	P 1 A	D1H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾⁴⁾		P
High temperature sensor size 3 for up to 230 °C (446 °F) (150 ... 610 mm diam. (5.90 ... 24 inch diam.))		Z	P 1 B	D2H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾⁴⁾		Q
High temperature sensor size 4 for up to 230 °C (446 °F) (400 ... 1200 mm diam. (15.75 ... 47.25 inch diam.))		Z	P 1 C	D4H (high precision) ⁵⁾	Mounting frame and straps provided up to 1200 mm (48") ²⁾⁴⁾		R
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):				Doppler	to 12" with strap kit, for up to 121 °C (250 °F)		S
B1H (high temperature range HP)		Z	P 1 K	High temperature sensor size 2 for up to 230 °C (446 °F) (30 ... 200 mm diam. (1.18 ... 7.67 inch diam.))		Z	Q 1 A
B2H (high temperature range HP)		Z	P 1 L	High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))		Z	Q 1 B
C1H (high temperature range HP) ⁵⁾		Z	P 1 M	High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))		Z	Q 1 C
C2H (high temperature range HP) ⁵⁾		Z	P 1 N	For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up ... 220 °F), nominal 65 °C (150 °F):			
D1H (high temperature range HP) ²⁾⁵⁾		Z	P 1 P	B1H (high temperature range HP)		Z	Q 1 K
D2H (high temperature range HP) ²⁾⁵⁾		Z	P 1 Q	B2H (high temperature range HP)		Z	Q 1 L
D4H (high temperature range HP) ²⁾⁵⁾		Z	P 1 R	C1H (high temperature range HP) ⁵⁾		Z	Q 1 M
Sensor for channel 2				C2H (high temperature range HP) ⁵⁾		Z	Q 1 N
(includes pipe mounting kit for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.				D1H (high temperature range HP) ²⁾⁵⁾		Z	Q 1 P
no sensor			A	D2H (high temperature range HP) ²⁾⁵⁾		Z	Q 1 Q
A2 universal	Trackmount and straps provided up to 75 mm (3")		B	D4H (high temperature range HP) ²⁾⁵⁾		Z	Q 1 R
B3 universal	Trackmount and straps provided up to 125 mm (5")		C				
C3 universal	Mounting frame and straps provided up to 300 mm (13")		D	Approvals			
D3 universal	Mounting frame and straps provided up to 600 mm (24")		E	FM/CSA/CE Dedicated		1	
E2 universal	Mounting frame and straps provided up to 1200 mm (48") ¹⁾⁴⁾		F	UL/ULc/CE Portable		0	

- Supplied spacer bar supports pipes up to 1050 mm (42 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).
- Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).
- Requires two R** cables per one RTD pair
- 600 mm (24") for portable systems only
- Made with stainless steel construction.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Cable assembly for sensors (add for # of channels)
See "Sensor cable selection chart"

K..

Cable assembly for RTDs (add for # of RTDs)
See "RTD cable selection chart"

R..

Cable termination kit (for one cable pair) dedicated only

- Termination for standard, plenum and armored sensor cable **T01**
- Termination for submersible sensor cable **T11**
- RTD cable termination kit for standard RTD **T21**
- RTD cable termination kit for submersible RTD **T31**
- Insert RTD cable termination kit **T41**
- Cable gland kit **T51**

Wet flow transfer calibration (priced on request)

6 point calibration 2/water (Price per channel)

- 2SS40 pipe **D01**
- 3CS40 pipe **D02**
- 4CS40 pipe **D03**
- 4SS40 pipe **D04**
- 6CS40 pipe **D05**
- 6SS40 pipe **D06**
- 6CS120 pipe **D07**
- 8CS40 pipe **D08**
- 8SS40 pipe **D09**
- 8CS120 pipe **D10**
- 10CS Standard pipe **D11**
- 10CS40 pipe **D12**
- 10SS40 pipe **D13**
- 12CS Standard pipe **D14**
- 12CS40 pipe **D15**
- 14CS30 pipe **D16**
- 14CS40 pipe **D17**
- 16CS Standard pipe **D18**
- 16CS40 pipe **D19**
- 18CS Standard pipe **D20**
- 20CS20 pipe **D21**
- 20CS30 pipe **D22**
- 24CS Standard pipe **D23**
- 24CS20 pipe **D24**
- 24CS30 pipe **D25**
- 30CS Standard pipe **D26**
- 36CS Standard pipe **D27**
- Other pipe, other liquid, additional points, witness **Y28**

Tag name plate

- Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.) **Y19**

MLFB example

Application example

A dedicated clamp-on energy meter is required for two separate return lines. Both will use clamp-on RTDs for the supply and return lines. AC power is available and data access will be via Modbus communication.

Pipe 1 is a DN150 (6") schedule 40 carbon steel line

Pipe 2 is a DN 300 (12") ductile iron line

MLFB Article No.: **7ME3500-2FA30-2NE0-Z**
K03 + K05 + R03 + R05 + R02 + R03

Selection and Ordering data

Article No.

Ord. code

SITRANS FUE1010 meter family

IP65 (NEMA 4X) enclosure

Dual channel

Dedicated Type 1 I/O option

90 ... 230 V AC power option

Modbus option

2 pairs of clamp-on RTDs

Sensor code for 6" pipe

Sensor code for 12" pipe

No approval required

30 m (100 ft) sensor cable for channel 1

61 m (200 ft) sensor cable for channel 1

30 m (100 ft) cable for RTD 1

61 m (200 ft) cable for RTD 2

15 m (50 ft) cable for RTD 3

30 m (100 ft) cable for RTD 4

Article No.	Ord. code
7ME3500-2FA30-2NE0-Z	
0	
2	
F	
A	
3	
2	
N	
E	
1	
	K 0 3
	K 0 5
	R 0 3
	R 0 5
	R 0 2
	R 0 3

Selection and Ordering data

Order code

Operating Instructions for SITRANS FUE1010

English NEMA 4X Wall mount

A5E03086491

German NEMA 4X Wall mount

A5E03086492

English IP40 NEMA 1 Battery powered

A5E02951524

German IP40 NEMA 1 Battery powered

A5E02951536

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

Universal sensor selection chart IP68

Based on pipe size (all pipe materials)					
Pipe size	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
		min.	max.	min.	max.
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3	D	51	305	2	12
D3	E	203	610	8	24
E2	F	254	6096	10	249

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Pipe Wall	Order Code	Pipe Wall [mm]		Pipe Wall [inch]	
		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H ¹⁾	M	4.06	5.84	0.16	0.23
C2H ¹⁾	N	5.84	8.13	0.23	0.32
D1H ¹⁾	P	8.13	11.18	0.32	0.44
D2H ¹⁾	Q	11.18	15.75	0.44	0.62
D4H ¹⁾	R	15.75	31.75	0.62	1.25

¹⁾ Made with stainless steel construction.

Sensor cable (single pair) selection chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket)	Submersible ¹⁾ (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored ¹⁾
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01²⁾	K11	K21	K31
15 (50)	K02	K12²⁾	K22	K32²⁾
30 (100)	K03²⁾	K13²⁾	K23	K33
46 (150)	K04²⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06²⁾	K16	K26	K36

¹⁾ Submersible and armored sensor cable is not available for portable versions.

²⁾ Standard MLFB for quick delivery

RTD cable (single) selection chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped)	Insert ¹⁾
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01²⁾	R21
15 (50)	R02²⁾	R22
30 (100)	R03²⁾	R23
46 (150)	R04	R24
61 (200)	R05	R25
91 (300)	R06	R26

¹⁾ Submersible RTD cable is not available for portable versions.

²⁾ Standard MLFB for quick delivery

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (HVAC)

Overview



The SITRANS FUE1010 dual channel clamp-on check metering kit is an all inclusive HVAC chilled water kit developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The meter's portability makes it capable of verifying the performance of meters based on any existing flow measurement principle: electromagnetic, vortex, insertion turbine, or ultrasonic. Perfect for areas where no metering exists. Ideal for balancing building performance. It accurately computes flow over an extremely wide range and measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. Dual channel models can measure two separate applications at the same time.

Benefits

- Performance check or verification of any type or brand of flowmeter
- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Field use is facilitated by meter portability charge for 4 hours of normal operation
- 1 MByte datalogger capability downloadable to PC via included RS 232 cable
- Performs fast, easy and cost-efficient on-site measurement of any convoluted pipe from 25.4 mm to 9.14 m (1.0" to 360")
- Delivered as an all inclusive kit with all the equipment needed to conduct performance and verification tests (cables, multiple sensors, flow transmitter etc.)
- Comes in a sturdy rolling case with a telescope handle that holds all the equipment needed to conduct performance and verification tests.

Application

The SITRANS FUE1010 Check Metering Kit is a highly accurate clamp-on non-intrusive ultrasonic flow display transmitter or revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems. This kit is ideal for applications which include:

- Chilled water sub-metering
- Condenser water
- Potable water
- Ammonia and glycol
- River and lake water
- Lake source cooling

Design

- IP40 (NEMA 1) Impact resistant enclosure, constructed of flame retardant ABS with polycarbonate display and polyester keypad
- Dual channel/dual path

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 $^{\circ}\text{C}$ (0.02 $^{\circ}\text{F}$)
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
 - Cooling load (kW/ton)
 - Coefficient of performance (COP)
 - Energy efficiency ratio (EER)
- Temperature is factory calibrated with built-in field calibrator
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Current, voltage, frequency and RS 232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

Technical specifications

Pipe sizes	25.4 mm ... 9.14 m (1 ... 360")
Accuracy	± 0.5 % ... ± 2.0 % of flow rate
Flow range	12 m/s (40 ft/s) bidirectional
Media temperature	-40 ... +104 °C (-40 ... 220 °F)
Enclosure ratings	IP40 (NEMA 1) impact resistant

See page 3/351 for complete technical specifications

Certificates and approvals

Portable enclosures	
Unclassified locations	UL ULc
Classified locations	
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

Selection and Ordering data

Article No.

Energy check metering kit **CQO:FUEHVACKIT**

Content of delivery

1	Dual channel portable submersible flow transmitter
1 pair	Universal sensors C3 ¹⁾
1 pair	Doppler sensors
1 pair	High precision sensors C2 ¹⁾
1 pair	High precision sensors D1 ¹⁾
2 pairs	RTDs
2 pairs	Mounting Ezclamp (4 mounting Ezclamp chains)
1	Battery charger
2 pairs	6 m (20 ft) sensor cables
1	RS 232 cable
4	RTD cable 6 m (20 ft)
4	Mountings for RTDs
1	Spacer bar (Portable)
2	F connector to BNC
1	Flow case
1	Flow meter manual
1	Laminated card set
1	Certificate of intrinsic calibration

¹⁾ Made with stainless steel construction.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

Overview



SITRANS FUH1010 clamp-on non-intrusive ultrasonic flowmeter is ideal for applications carrying crude oil, refined petroleum or liquefied gas.

SITRANS FUH1010 has three application areas: Interface detectors, precision volume or standard volume flowmeters.

Benefits

For all SITRANS FUH1010 products

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio, 30:1
- Choice of single, dual, or optional, three or four path versions.
 - Single path version reduces initial investment
 - Two or optional three and four path versions provide higher accuracy, especially where limited straight run or poor flow profile exists
- WideBeam technology
 - Helps provide improved accuracy over a wide range of liquid conditions and flow rates
 - Accommodates pipelines transporting multiple liquid products
- ZeroMatic Path automatically corrects for zero drift without stopping flow

Interface detection

- Outputs liquid density and API as a direct replacement for intrusive densitometers
- Exceptional repeatability is maintained, independent of changes in temperature, pressure or viscosity
- No need for straight run

Precision volume

- Moderate cost
- Precise measurement is maintained with automatic "Reynolds Number" compensation for temperature and viscosity changes.

Standard volume

- Exceptional repeatability is maintained, independent of changes in temperature, density or viscosity
- Batch interface and product quality diagnostics provided
- Density and API outputs provided
- Scraper („pig“) detection provided

Application

Interface detection

- Precise identification of interfaces on multi-liquid pipelines
- Product identification
- Density indication

Precision volume

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- "Pig" detection
- Chemical and petrochemical processing

Design

SITRANS FUH1010 is available in three enclosures:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiber-glass reinforced polyester with stainless steel hardware and polyester keypad
 - Single path
 - Dual path
 - Optional four path
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single path
 - Dual path (option)
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, with glass window
 - Single path
 - Dual path
 - Four path (optional)
- There are 2 types of mounting assemblies
 - Aluminum mounting frames (default)
 - Stainless steel weld seal (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flowmeters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact explosionproof flowmeter has a 2 x 16 alpha-numeric LCD display
- Current, voltage, status alarm, frequency outputs and communications HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232 (see specification section for details)
- Analog inputs (see specification section for details)
- ZeroMatic Path automatically corrects for zero drift
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

Technical specifications

Specifications for interface detectors

Accuracy

Accuracy	± 0.05 of API No.
Repeatability	± 0.01 of API No.

Specifications for volumetric and mass flowmeters

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent

Accuracy

Typical accuracy	± 0.5 to 1 % of flow
Calibratable accuracy	± 0.15 % ... 0.3 % of flow, depending on version
Batch repeatability	± 0.05 % of flow, maximum

Specifications for all SITRANS FUH1010 products

Input

Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Analog inputs	<ul style="list-style-type: none"> Current: 4 x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))

Output

Standard outputs	<ul style="list-style-type: none"> Current: 20 mA (1 kΩ at 30 VDC) Voltage: 10 V DC (5 kΩ minimum) (None for IP65 (NEMA 7) enclosure) Pulse Rate: 5 kHz, Digital Quad. (None for IP65 (NEMA7)) VT100 RS 232
Extended outputs	<ul style="list-style-type: none"> HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 4 x 4 ... 20 mA (not for IP65 (NEMA 7) enclosure) Form C relays (not for IP65 (NEMA 7) enclosure) Digital pulse (not for IP65 (NEMA 7) enclosure)
Status/Alarm I/O	<ul style="list-style-type: none"> Programmable relays (not for IP65 (NEMA 7) enclosure) Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)¹⁾ Totalizer hold switch input (not for IP65 (NEMA 7) enclosure)¹⁾ Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only)¹⁾ Opto iso. totalizer hold switch input (for IP65 (NEMA 7) enclosure, only)¹⁾

Accuracy

Zero Drift	0.0003 m/s (0.001 ft/s), with ZeroMatic Path active (not provided for interface detector)
Data refresh rate	5 Hz

Rated operation conditions

Degree of protection	<ul style="list-style-type: none"> Wall mount IP65 (NEMA 4X) Compact explosionproof IP65 (NEMA 7) Wall mount explosionproof IP66 (NEMA 7)
Liquid temperature	<ul style="list-style-type: none"> Standard -40 ... +120 °C (-40 ... +250 °F) Optional -40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply

<ul style="list-style-type: none"> IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof 	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
<ul style="list-style-type: none"> IP65 (NEMA 7) compact explosionproof 	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W

Indication and operation

Data logger memory	1 MByte
Display	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures 128 x 240 pixel LCD with backlight IP65 (NEMA 7) Enclosure 2 x 16 Alphanumeric LCD Display
Keypad	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures 33 keypad buttons with tactile feedback IP65 (NEMA 7) Enclosure 5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

¹⁾ Totalizer switch inputs are not provided for the interface detector.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

Certificates and approvals

IP65 (NEMA 4X) wall mount enclosure

FM and CSA

- Transmitter
N-I Class I, Div 2
S Class II, Div 2
Sensor
- I.S. Class I, II, Div 1

CE

EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

C-TICK

ATEX

- Transmitter:
Ex II (1) G [Ex ia] IIC
EX II 3 (1) G Ex nC [ia] IIC T5
- Sensors:
Ex II 1 G Ex ia IIC T5

IP65 (NEMA 7) compact explosion-proof enclosure ratings

FM and CSA

- Transmitter
XP Class I, Div 1
D-I Class II, Div 1
N-I Class I, Div 2
S Class II, Div 2
Sensor
- I.S. Class I, II, Div 1

CE

• EMC Directive 2004/108/EC
• ATEX Directive 94/9/EC

C-TICK

ATEX

- Transmitter:
Ex II 2 (1) G Ex d [ia] IIB + H2 T5
- Sensors:
Ex II 1 G Ex ia IIC T5

IP66 (NEMA 7) wall mount explosionproof enclosure ratings

FM and CSA

- Transmitter
XP Class I, Div 1
D-I Class II, Div 1
N-I Class I, Div 2
S Class II, Div 2
Sensor
- I.S. Class I, II, Div 1

CE

EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

ATEX

- Transmitter:
Ex II (1) G [Ex ia] IIC
Ex II 3 (1) G Ex nC [ia] IIC T5
Ex II 2 (1) G Ex d [ia IIC] IIB + H2 T5
- Sensors:
Ex II 1 G Ex ia IIC T5

Standard MLFB for quick delivery on SITRANS FUH1010 (Oil)

Selection and Ordering data	Article No.	Order code
SITRANS FUH1010 (Oil)	7ME360 - - - - - 0 - - - - -	K12 + K12 + R12
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Design</p> <p>IP65 (NEMA 4X) wall mount</p> <p>Number of ultrasonic paths/meter type</p> <p>Dual path Standard Volume</p> <p>Flowmeter functions and I/O configurations</p> <p>includes graphic or digital display, IP66 (BNB6665 (NEMA 4X)) and IP66 (NEMA 7) wall mount explosionproof units:</p> <p>Standard</p> <ul style="list-style-type: none"> • Graphic display • 4 x 4 ... 20 mA analog input • 2 x 0 ... 10 V • 2 x 4 ... 20 mA • 2 x pulse outputs • 4 x form C relays • 2 x RTD input <p>Meter power options</p> <p>90 ... 240 V AC</p> <p>Communication options</p> <p>VT100 RS 232</p> <p>RTD temperature sensor</p> <p>(includes mounting hardware for pipes above 1.5"/38 mm OD)</p> <p>No RTDs</p> <p>1 x standard clamp-on RTD</p> <p>2 x standard clamp-on RTD</p> <p>1 x submersible clamp-on RTD</p> <p>2 x submersible clamp-on RTD</p> <p>RTD</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Temperature input is required for SITRANS FUH1010 systems 2. Only the Interface detector set up as a dual channel can use 2 RTD's <p>Sensor for channel 1</p> <p>(includes pipe mounting kit and spacer bar for indicated max. outer diam. listed)</p> <p>no sensor</p> <p>C2H (high precision)¹⁾ Mounting frame and straps provided up to 600 mm (24")</p> <p>D1H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")</p> <p>D4H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")</p> <p>D1H (high precision)¹⁾ High Temperature to 104 °C/220 °F</p> <p>Sensor for channel 2</p> <p>(includes pipe mounting kit and spacer bar for indicated max. OD listed)</p> <p>See "Sensor selection charts" for specifications.</p> <p>no sensor</p> <p>C2H (high precision)¹⁾ Mounting frame and straps provided up to 600 mm (24")</p> <p>D1H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")</p> <p>D4H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")</p> <p>D1H (high precision)¹⁾ High Temperature to 104 °C/220 °F</p> <p>Approvals</p> <p>FM/CSA/CE (default)</p> <p>ATEX, CE, C-TICK</p> <p>Standard MLFB product offering represents 4 to 6 weeks delivery time</p> <p>¹⁾ Made with stainless steel construction.</p>	<p>0</p> <p>4</p> <p>A</p> <p>A</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>A</p> <p>N</p> <p>P</p> <p>R</p> <p>Z</p> <p>P 1 P</p> <p>A</p> <p>N</p> <p>P</p> <p>R</p> <p>Z</p> <p>Q 1 P</p> <p>1</p> <p>2</p>	



For sensor and RTD cables for quick delivery see tables at end of section.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

Selection and Ordering data

SITRANS FUH1010 (Oil)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

Article No. Ord. code

7ME3600-

7ME3601-

7ME3603-

- - - - - 0 - - - - -

↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Number of ultrasonic paths/meter type

- Single path (precision volume) 0
- Single path (interface detector) 1
- Dual channel/Dual path (interface detector) 2
- Dual path (precision volume) 3
- Dual path (standard volume/mass) 4
- Special: Four path (standard volume/mass) only 9

H 1 A

Flowmeter functions and I/O configurations

Includes graphic or digital display

IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionproof) units

- Standard A
 - Graphic display
 - 4 x 4 ... 20 mA analog input
 - 2 x 0 ... 10 V
 - 2 x 4 ... 20 mA analog output
 - 2 x pulse output
 - 4 x form C relay
 - 2 x RTD input
- Extended I/O option C
 - additional 2 x 4 ... 20 mA outputs
 - Form C relays
 - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)

IP65 (NEMA 7) compact explosionproof units

- Standard D
 - Digital display
 - 2 x 4 ... 20 mA (Loop)
 - 2 x 4 ... 20 mA analog input
 - 2 x status (open collector)
 - 1 x RTD input
- Digital pulse option F
 - 1 x digital pulse open collector output
 - 2 x 4 ... 20 mA (Loop)
 - 2 x 4 ... 20 mA analog input
 - 1 x status (open collector)
 - 1 x RTD input

Meter power options

- 90 ... 240 V AC A
- 9 ... 36 V DC (except compact NEMA 7) B
- 9 ... 36 V DC negative GND (compact only) J
- 9 ... 36 V DC positive GND (compact only) K

Communication options

VT100 RS 232 0
 HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232 2

Selection and Ordering data

SITRANS FUH1010 (Oil)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

Article No. Ord. code

7ME3600-

7ME3601-

7ME3603-

- - - - - 0 - - - - -

RTD temperature sensor

(includes mounting hardware for pipes above 1.5" OD)

No RTDs (Note: temperature input is required for SITRANS FUH systems) 0

1 x Standard clamp-on RTD 1

2 x Standard clamp-on RTD²⁾ 2

1 x Submersible clamp-on RTD 3

2 x Submersible clamp-on RTD²⁾ 4

Sensor for channel/path 1

(includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed)

See "Sensor selection charts" for specifications.

no sensor A

For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):

A2H (high precision) Trackmount and straps provided up to 75 mm (3") H

A3H (high precision) Trackmount and straps provided up to 75 mm (3") J

B1H (high precision) Trackmount and straps provided up to 125 mm (5") K

B2H (high precision) Trackmount and straps provided up to 125 mm (5") L

B3H (high precision) Trackmount and straps provided up to 125 mm (5") T

C1H (high precision)³⁾ Mounting frame and straps provided up to 600 mm (24")¹⁾ M

C2H (high precision)³⁾ Mounting frame and straps provided up to 600 mm (24")¹⁾ N

D1H (high precision)³⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾ P

D2H (high precision)³⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾ Q

D3H (high precision)³⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾ U

D4H (high precision)³⁾ Mounting frame and straps provided up to 1200 mm (48")¹⁾ R

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FUH1010 (Oil)			SITRANS FUH1010 (Oil)		
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3600-		<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3600-	
	7ME3601-			7ME3601-	
	7ME3603-			7ME3603-	
	0 -			0 -	
Sensor for channel/path 1 (continued)			For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	P 1 K	B1H (high temperature range HP)	Z	Q 1 K
B2H (high temperature range HP)	Z	P 1 L	B2H (high temperature range HP)	Z	Q 1 L
B3H (high temperature range HP)	Z	P 1 T	B3H (high temperature range HP)	Z	Q 1 T
C1H (high temperature range HP) ³⁾	Z	P 1 M	C1H (high temperature range HP) ³⁾	Z	Q 1 M
C2H (high temperature range HP) ³⁾	Z	P 1 N	C2H (high temperature range HP) ³⁾	Z	Q 1 N
D1H (high temperature range HP) ¹⁾³⁾	Z	P 1 P	D1H (high temperature range HP) ¹⁾³⁾	Z	Q 1 P
D2H (high temperature range HP) ¹⁾³⁾	Z	P 1 Q	D2H (high temperature range HP) ¹⁾³⁾	Z	Q 1 Q
D3H (high temperature range HP) ¹⁾³⁾	Z	P 1 U	D3H (high temperature range HP) ¹⁾³⁾	Z	Q 1 U
D4H (high temperature range HP) ¹⁾³⁾	Z	P 1 R	D4H (high temperature range HP) ¹⁾³⁾	Z	Q 1 R
Sensor for channel/path 2			Approvals		
(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			FM/CSA/CE/C-TICK (default), also for non hazardous area	1	
no sensor	A		ATEX	2	
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			1) Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).		
A2H (high precision) Trackmount and straps provided up to 75 mm (3")	H		2) Dual channel interface detector only		
A3H (high precision) Trackmount and straps provided up to 75 mm (3")	J		3) Made with stainless steel construction.		
B1H (high precision) Trackmount and straps provided up to 125 mm (5")	K				
B2H (high precision) Trackmount and straps provided up to 125 mm (5")	L				
B3H (high precision) Trackmount and straps provided up to 125 mm (5")	T				
C1H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾	M				
C2H (high precision) ³⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾	N				
D1H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	P				
D2H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	Q				
D3H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	U				
D4H (high precision) ³⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	R				
			Selection and Ordering data		Order code
			Further designs		
			Please add "-Z" to Article No. and specify Order code(s).		
			Cable assembly for sensors (add for # of paths) See "Sensor cable selection chart"		K..
			Cable assembly for RTDs (add for # of RTDs) See "RTD cable selection chart"		R..
			Cable termination kit (for one cable pair)		
			• Termination for standard, plenum and armored sensor cable		T01
			• Termination for submersible cable		T11
			• RTD cable termination kit for standard RTD		T21
			• RTD cable termination kit for submersible RTD		T31
			• Cable gland kit		T51
			Languages (Meter and Documentation), English (default)		
			• German		B10
			• French		B12
			• Spanish		B13
			• Italian		B14
			Tag name plate		
			• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)		Y19

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

3

Selection and Ordering data	Article No.
Operating Instructions for SITRANS FUH1010	
English NEMA 4X & NEMA 7 wall mount Standard Volume	A5E02951449
German NEMA 4X & NEMA 7 wall mount Standard Volume	A5E02951529
English NEMA 4X & NEMA 7 wall mount explosionproof Precision Volume	CQO:1010PVNFM-3
English NEMA 4X & NEMA 7 wall mount explosionproof Interface Detector	A5E02951504
English NEMA 7 compact explosionproof Standard Volume	CQO:1010DVXFM-3
English NEMA 7 compact explosionproof Precision Volume	CQO:1010PVXFM-3
English NEMA 7 compact explosionproof Interface Detector	CQO:1010BXXFM-3

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

MLFB example

Application example

A clamp-on meter is required for a 12" carbon steel hydrocarbon line flowing multiple products, with a wall thickness of 12.7 mm (0.5"). Meter electronics are to be located in a Class I Div 2 area only 60 ft from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Article No.: **7ME3600-3CB00-3QQ1-Z**
K03 + K03 + R03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUH1010 meter family	7ME3600-3CB00-3QQ1-Z	
IP65 (NEMA 4X) enclosure	0	
Dual path precision volume	3	
Custody Transfer option with digital pulse	C	
9 ... 36 V DC power option	B	
VT100 RS 232	0	
RTD required for viscosity comp	3	
Sensor code for path 1	Q	
Sensor code for path 2	Q	
FM approval required	1	
30 m (100 ft) sensor cable for path 1		K03
30 m (100 ft) sensor cable for path 2		K03
30 m (100 ft) cable for RTD		R03

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Sensor Pipe wall	Order Code	Pipe wall (mm)		Pipe wall (inch)	
		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H ¹⁾	M	4.06	5.84	0.16	0.23
C2H ¹⁾	N	5.84	8.13	0.23	0.32
D1H ¹⁾	P	8.13	11.18	0.32	0.44
D2H ¹⁾	Q	11.18	15.75	0.44	0.62
D4H ¹⁾	R	15.75	31.75	0.62	1.25
B3H ¹⁾	T	2.7	3.3	0.106	0.128
D3H ¹⁾	U	7.4	9.0	0.293	0.354

¹⁾ Made with stainless steel construction.

Sensor Cable Selection Chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket)	Submersible (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01¹⁾	K11	K21	K31
15 (50)	K02	K12¹⁾	K22	K32¹⁾
30 (100)	K03¹⁾	K13¹⁾	K23	K33
46 (150)	K04¹⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

¹⁾ Standard MLFB for quick delivery

RTD Cable Selection Chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped)	Submersible (extruded jacket)
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01¹⁾	R11
15 (50)	R02¹⁾	R12
30 (100)	R03¹⁾	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

¹⁾ Standard MLFB for quick delivery

Overview



SITRANS FUG1010 clamp-on non-intrusive ultrasonic flow transmitter is ideal for natural and process gas applications, including checkmetering, allocation, production, storage and gas fired power station applications.

SITRANS FUG1010 is available in single, dual and optional four path configurations, with your choice of IP65 (NEMA 4X) wall mount, IP65 (NEMA 7) compact explosionproof, and IP66 (NEMA 7) wall mount explosionproof enclosures.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear as found in turbine and PD meters
- Eliminates the pressure drop or energy loss in orifice metering
- Wide turn-down ratio
- Choice of single, dual or optional four path versions
 - Single path version reduces initial investment
 - Multiple path versions provide higher accuracy, especially with limited straight run and poor flow profile conditions
 - In diametric reflect mode configuration, the meter is less sensitive to crossflow and swirl
- Wide-Beam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Optional rugged stainless steel sensor enclosure permits permanent and direct burial installations
- Easy to use "Si-Ware" diagnostic software

Application

SITRANS FUG1010 is ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) gas analysis
- Production
- Storage

Design

SITRANS FUG1010 is available in three enclosures:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiber-glass reinforced polyester with stainless steel hardware and polyester keypad
 - Single path
 - Dual path
 - Four path (optional)
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single path
 - Dual path
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum stainless steel hardware, with glass window
 - Single path
 - Dual path
 - Four path (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow transmitter has a 2 x 16 alphanumeric LCD display
- Current, voltage, frequency and RS 232 outputs (see specification section for details)
- Analog inputs for pressure and temperature
- ZeroMatic Path automatically compensates for zero flow drift
- Bidirectional flow operation
- 1 Mbyte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options
- Internal AGA-8 table for fixed gas composition is available for standard volume computation.
- Complete application and operation diagnostics, to assure calibration and operational integrity
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

Technical specifications

Input		Accuracy	
Flow range	± 30 m/s (± 100 ft/s), bidirectional	Typical accuracy	1 % ... 2 % of actual volume reading (higher accuracy is pipe condition and flow profile dependent)
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent	Calibratable Accuracy	± 0.2 ... 0.5 % of flow
Minimum pressure	7 ... 10 bar (100 ... 145 psi), typical (gas composition and application dependent; plastic pipes support operation at atmospheric pressure)	Repeatability	0.05 % ... 0.1 %, of actual volume reading, for 1.5 ... 30 m/s (5 ... 100 ft/s) velocities (pipe condition dependent)
Pipe size	25 mm ... 1.52 m (1" ... 48") (for other sizes, consult factory)	Zero drift	0.0003 m/s (0.001 ft/s), with ZeroMatic Path active
Analog inputs	Current: 20 mA, programmable (IP65 (NEMA 7) enclosure has 20 mA, programmable)	Data refresh rate	5 Hz
Output		Rated operation conditions	
Standard outputs	<ul style="list-style-type: none"> Current: 20 mA, a programmable, standard Additional 2 x optional, except IP65 (NEMA 7) Voltage: 10 V DC, menu programmable (None for IP65 (NEMA 7) enclosure) Open collector digital pulses (quadrature) (None for IP65 (NEMA 7) enclosure) Pulse rate: 5 kHz (None for IP65 (NEMA 7) enclosure) Optically isolated digital pulse & source, IP65 (NEMA 7) enclosure only VT100 RS 232 	Degree of protection	<ul style="list-style-type: none"> Wall mount IP65 (NEMA 4X) Compact explosionproof IP65 (NEMA 7) Wall mount explosionproof IP66 (NEMA 7)
Extended outputs	<ul style="list-style-type: none"> HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 	Gas temperature	-40 ... +60 °C (-40 ... +140 °F) (for higher temperatures consult factory)
Status/Alarm I/O	<ul style="list-style-type: none"> Programmable form C relays (not for IP65 (NEMA 7) enclosure) Programmable N.O. Mer. Wet. Relays optional (not for IP65 (NEMA 7) enclosure) Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) 1 Totalizer clear switch input (not for IP65 (NEMA 7)) 1 Totalizer hold switch input (not for IP65 (NEMA 7) enclosure) Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only) Opto iso. totalizer hold switch input (for IP 65 (NEMA 7) enclosure, only) 	Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
		Design	
		Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
		Weight	see diagrams
		Power supply	
		<ul style="list-style-type: none"> For IP65 (NEMA 4X) and IP66 (NEMA 7) 	<ul style="list-style-type: none"> 90 ... 240 V AC, 50 ... 60 Hz (30 VA) or 9 ... 36 V DC (12 W)
		<ul style="list-style-type: none"> For IP65 (NEMA 7): 	<ul style="list-style-type: none"> 90 ... 240 V AC, 50 ... 60 Hz (15 VA) or 9 ... 36 V DC (10 W)
		Indication and operation	
		Data logger memory	1 Mbyte, programmable for 17 data functions
		Display	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) enclosures 128 x 240 pixel LCD with backlight IP65 (NEMA 7) enclosure 2 x 16 alphanumeric LCD display
		Keypad	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures 33 keypad buttons with tactile feedback IP65 (NEMA 7) Enclosure 5 magnetic hall effect switches
		Language options	English, Spanish, German, Italian, French

Certificates and approvals

IP65 (NEMA 4X) wall mount flow display transmitter ratings

FM and CSA

- Transmitter
N-I Class I, Div 2
S Class II, Div 2

- Sensor
I.S. Class I, II, Div 1

CE

EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

C-TICK

ATEX

- Transmitter:
Ex II (1) G [Ex ia] IIC
Ex II 3 (1) G Ex nC [ia] IIC T5

- Sensors:
Ex II 1 G Ex ia IIC T5

IP65 (NEMA 7) compact explosion-proof enclosure ratings

FM and CSA

- Transmitter
XP Class I, Div 1
D-I Class II, Div 1
N-I Class I, Div 2
S Class II, Div 2

- Sensor
I.S. Class I, II, Div 1

CE

EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

C-TICK

ATEX

- Transmitter:
Ex II 2 (1) G Ex d [ia] IIB + H2 T5

- Sensors:
Ex II 1 G Ex ia IIC T5

IP66 (NEMA 7) wall mount explosionproof enclosure ratings

FM and CSA

- Transmitter
XP Class I, Div 1
D-I Class II, Div 1
N-I Class I, Div 2
S Class II, Div 2

- Sensor
I.S. Class I, II, Div 1

CE

EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

C-TICK

ATEX

- Transmitter:
Ex II (1) G [Ex ia] IIC
Ex II 3 (1) G Ex nC [ia] IIC T5
Ex II 2 (1) G Ex d [ia] IIC IIB+H2 T5

- Sensors:
Ex II 1 G Ex ia IIC T5

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

Standard MLFB for quick delivery on SITRANS FUG1010 (Gas)

Selection and Ordering data

Article No.

Order code

SITRANS FUG1010 (Gas)

7ME361 - - - - 0 - - - - K12 + K12 + R12

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Design

IP65 (NEMA 4X) wall mount

Number of ultrasonic paths

Dual path

Flowmeter functions and I/O configurations

includes graphic or digital display

- Extended I/O option
 - additional 2 x 4 ... 20 mA
 - form C relays
 - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)

Meter power options

9 ... 36 V, DC (except compact NEMA 7)

Communication options

VT100 RS 232

HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2

RTD temperature sensor

(includes mounting hardware for pipes above 1.5"/38 mm OD)

No RTDs

- 1 x standard clamp-on RTD
- 2 x standard clamp-on RTD
- 1 x submersible clamp-on RTD
- 2 x submersible clamp-on RTD

Notes:

- Temperature input is required for FUH systems
- Only the Interface detector set up as a dual channel can use 2 RTD's

Sensor for channel 1

(includes pipe mounting kit and spacer bar for indicated max. OD listed)
See "Sensor selection charts" for specifications.

no sensor

- C2H (high precision)¹⁾ Mounting frame and straps provided up to 600 mm (24")
- D1H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")
- D2H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")

Sensor for channel 2

(includes pipe mounting kit and spacer bar for indicated max. OD listed)
See "Sensor selection charts" for specifications.

no sensor

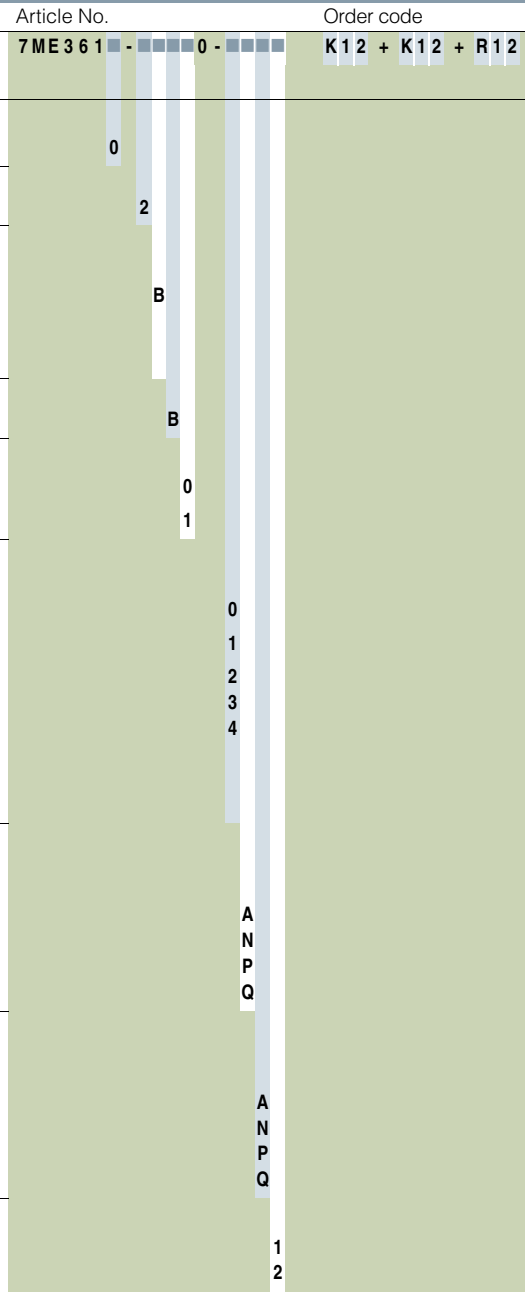
- C2H (high precision)¹⁾ Mounting frame and straps provided up to 600 mm (24")
- D1H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")
- D2H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")

Approvals

- FM/CSA/CE (default)
- ATEX, CE, C-TICK

Standard MLFB product offering represents 4 to 6 weeks delivery time
For sensor and RTD cables for quick delivery see tables at end of section.

¹⁾ Made with stainless steel construction.



3

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 (Gas)			SITRANS FUG1010 (Gas)		
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3610- 7ME3611- 7ME3613-		<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3610- 7ME3611- 7ME3613-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection chart" for specifications.		
Number of channels/ultrasonic paths			no sensor		
Single path	1				A
Dual path	2				
Special: Four path (NEMA 4X and NEMA 7 wall mount only)	9	H 1 A			
Flowmeter functions and I/O configurations (includes graphic or digital display)			For the following B1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):		
IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof units			B1H (high precision) Trackmount and straps provided up to 125 mm (5")		
<ul style="list-style-type: none"> • Standard (all but NEMA 7 compact explosionproof) <ul style="list-style-type: none"> - Graphic display - 4 x 4 ... 20 mA analog input - 2 x 0 ... 10 V - 2 x 4 ... 20 mA analog output - 2 x pulse output - 4 x Form C relays - 2 x RTD input • Extended I/O option <ul style="list-style-type: none"> - additional 2 x 4 ... 20 mA - Form C relays - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL) 	A		B2H (high precision) Trackmount and straps provided up to 125 mm (5")		L
IP65 (NEMA 7) compact explosionproof units			B3H (high precision) Trackmount and straps provided up to 125 mm (5")		
<ul style="list-style-type: none"> • Standard <ul style="list-style-type: none"> - Digital display - 2 x 4 ... 20 mA (loop) - 2 x 4 ... 20 mA analog input - 2 x status (open collector) - 1 x RTD input • Digital pulse option <ul style="list-style-type: none"> 1 x digital pulse open collector output 	B		C1H (high precision) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾		M
Meter power options			C2H (high precision) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾		
90 ... 240 V AC	A		D1H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		
9 ... 36 V DC (except NEMA 7 compact explosionproof)	B		D2H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		
9 ... 36 V DC negative GND (Compact only)	J		D3H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		
9 ... 36 V DC positive GND (Compact only)	K		D4H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		
Communication options			For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
VT100 RS 232	0		B1H (high temperature range HP)		
HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232	2		B2H (high temperature range HP)		
RTD temperature sensor (includes mounting hardware for pipes above 1.5" outer diameter)			B3H (high temperature range HP)		
No RTDs	0		C1H (high temperature range HP) ²⁾		
1 x standard clamp-on RTD	1		C2H (high temperature range HP) ²⁾		
2 x standard clamp-on RTD	2		D1H (high temperature range HP) ¹⁾²⁾		
1 x submersible clamp-on RTD	3		D2H (high temperature range HP) ¹⁾²⁾		
2 x submersible clamp-on RTD	4		D3H (high temperature range HP) ¹⁾²⁾		
			D4H (high temperature range HP) ¹⁾²⁾		
				Z	P 1 K
				Z	P 1 L
				Z	P 1 T
				Z	P 1 M
				Z	P 1 N
				Z	P 1 P
				Z	P 1 Q
				Z	P 1 U
				Z	P 1 R

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 (Gas)	7ME3610-	
• IP65 (NEMA 4X) wall mount	7ME3611-	
• IP65 (NEMA 7) compact explosionproof	7ME3613-	
• IP66 (NEMA 7) wall mount explosionproof	0 -	
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection chart" for specifications.		
no sensor	A	
For the following B1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):		
B1H (high precision) Trackmount and straps provided up to 125 mm (5")	K	
B2H (high precision) Trackmount and straps provided up to 125 mm (5")	L	
B3H (high precision) Trackmount and straps provided up to 125 mm (5")	T	
C1H (high precision) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾	M	
C2H (high precision) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾	N	
D1H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	P	
D2H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	Q	
D3H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	U	
D4H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾	R	
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.	Z	Q 1 Y
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	Q 1 K
B2H (high temperature range HP)	Z	Q 1 L
B3H (high temperature range HP)	Z	Q 1 T
C1H (high temperature range HP) ²⁾	Z	Q 1 M
C2H (high temperature range HP) ²⁾	Z	Q 1 N
D1H (high temperature range HP) ²⁾	Z	Q 1 P
D2H (high temperature range HP) ²⁾	Z	Q 1 Q
D3H (high temperature range HP) ²⁾	Z	Q 1 U
D4H (high temperature range HP) ²⁾	Z	Q 1 R
Approvals		
FM/CSA/CE/C-TICK (default)		1
ATEX, CE, C-TICK		2

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

²⁾ Made with stainless steel construction.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable assembly for sensors (add for # of paths) See "Sensor cable selection chart"	K..
Cable assembly for RTDs (add for # of RTDs) See "RTD cable selection chart"	R..
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored sensor cable	T01
• Termination for submersible sensor cable	T11
• RTD cable termination kit for standard RTD	T21
• RTD cable termination kit for submersible RTD	T31
• Insert RTD cable termination kit	T41
• Cable gland kit	T51
Languages (Meter and Documentation) for compact NEMA 7	
• German	B10
• French	B12
• Spanish	B13
• Italian	B14
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	Y19

MLFB example

Application example

A clamp-on meter is required for a 300 mm (12") carbon steel gas line with a wall thickness of 12.7 mm (0.5"). Meter electronics are to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Article No.: **7ME3610-2BB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 meter family	7 ME 3 6 1 -	0 -
IP65 (NEMA 4X) wall mount	0	
Dual path	2	
Option with digital pulse	B	
9 ... 36 V DC power option	B	
RS 232 Standard	0	
No RTD required	0	
Sensor code for path 1	Q	
Sensor code for path 2	Q	
FM approval required	1	
30 m (100 ft) sensor cab. for path 1		K 0 3
30 m (100 ft) sensor cab. for path 2		K 0 3

Selection and Ordering data	Article No.
Operating Instructions for SITRANS FUG1010	
English NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E02951519
German NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E02951531
English NEMA 7 compact explosionproof	CQO:1010GCXFM-3

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Sensor Pipe wall	Order Code	Pipe wall (mm)		Pipe wall (inch)	
		min.	max.	min.	max.
B1H	K	2.0	3.0	0.08	0.12
B2H	L	3.0	4.1	0.12	0.16
B3H	T	2.7	3.3	0.106	0.128
C1H ¹⁾	M	4.1	5.8	0.16	0.23
C2H ¹⁾	N	5.8	8.1	0.23	0.32
D1H ¹⁾	P	8.1	11.2	0.32	0.44
D2H ¹⁾	Q	11.2	15.7	0.44	0.62
D3H ¹⁾	U	7.4	9.0	0.293	0.354
D4H ¹⁾	R	15.7	31.8	0.62	1.25

¹⁾ Made with stainless steel construction.

Sensor Cable (pair) Selection Chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket)	Submersible (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01¹⁾	K11	K21	K31
15 (50)	K02	K12¹⁾	K22	K32¹⁾
30 (100)	K03¹⁾	K13¹⁾	K23	K33
46 (150)	K04¹⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06¹⁾	K16	K26	K36

¹⁾ Standard MLFB for quick deliver

RTD Cable (single) Selection Chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped)	Submersible (extruded jacket)
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01¹⁾	R11
15 (50)	R02¹⁾	R12
30 (100)	R03¹⁾	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

¹⁾ Standard MLFB for quick deliver

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 Gas check metering kit

Overview



The clamp-on SITRANS FUG1010 Gas check metering kit is an all-inclusive solution developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The kit is ideal for natural and process gas applications, including check metering, allocation, production, storage and gas fired power station applications. The flowmeter is available with FM/CSA or ATEX approval.

Benefits

- Performance check or verification of any type or brand of flow meter
- WideBeam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Fast, easy and cost-efficient on-site measurement of any convoluted pipe from 50 ... 1200 mm (2 ... 48") up to 15.7 mm (0.62") pipe wall thickness
- Delivered as an all inclusive kit in a sturdy rolling case that holds all the equipment needed to conduct performance and verification tests (cables, multiple sensors, transmitter, etc.)

Application

The SITRANS FUG1010 Gas check metering kit is ideal for most natural and process gas industry applications, including:

- Check metering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) gas analysis
- Production
- Storage

Design

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
- Dual channel

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS 232 outputs (see Technical specification section for details)
- Analog inputs for pressure and temperature
- Internal AGA-8 table for fixed gas composition is available for standard volume computation
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice
- Bi-directional flow operation
- English, Spanish, German, Italian and French language options

Technical specifications

Pipe sizes	50 ... 1200 mm (2 ... 48") up to 15.7 mm (0.62") pipe wall thickness
Accuracy	±0.5 %...1.0 % of flow rate
Flow range	30 m/s (100 ft/s) bidirectional
Media temperature	-40 ...+60 °C (-40 ... +140 °F)
Enclosure ratings	IP65 (NEMA 4X)

See page 3/368 for complete technical specifications

Certificates and approvals

FM and CSA

- Transmitter
N-I Class I, Div 2
S Class II, Div 2
- Sensor
I.S. Class I, II, Div 1

ATEX

- Transmitter:
Ex II (1) G [Ex ia] IIC
Ex II 3 (1) G Ex nC [ia] IIC T5

CE

- Sensors:
Ex II 1 G Ex ia IIC T5
EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

Selection and Ordering data

Article No.

SITRANS FUG1010 Gas Check Metering Kit

- FM/CSA approved
- ATEX approved

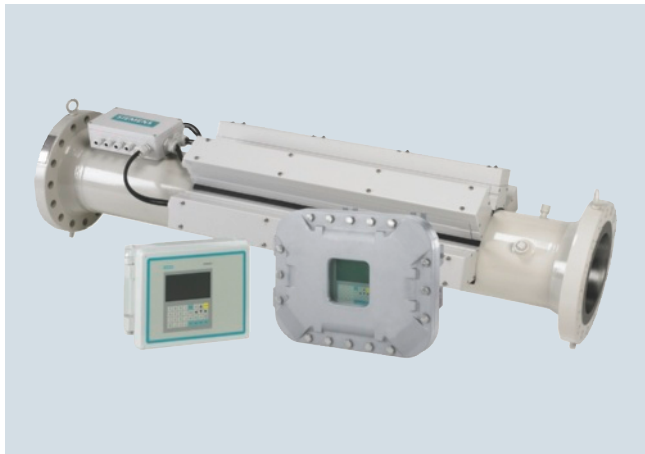
CQO:FUG-GASKIT
CQO:FUG-GASAKIT

Content of delivery

1	Dual channel dedicated transmitter (FM/CSA or ATEX approved)
1 pair	Transportable sensors C1 ¹⁾ Pipe: od 3.500 inch, wt 0.216 inch, carbon steel
1 pair	Transportable sensors C2 ¹⁾ Pipe: od 6.625 inch, wt 0.280 inch, carbon steel
1 pair	Transportable sensors D1 ¹⁾ Pipe: od 10.750 inch, wt 0.365 inch, carbon steel
1 pair	Transportable sensors D2 ¹⁾ Pipe: od 16.000 inch, wt 0.500 , carbon steel
2 pairs	Sensor cables 6m (20 ft)
2 pairs	Mounting frames
2	Spacer bar (dedicated)
1	Mounting strap
4	Couplant CC128
1 kit	Couplant/Damping Film
1	Flow case
1	Flowmeter manual
1	Laminated card set

¹⁾ Made with stainless steel construction.

Overview



SITRANS FUT1010 is the latest ultrasonic flow meter from Siemens. Ideal for applications within the liquid and gas hydrocarbon industry capable of providing custody transfer accuracy. With the newly developed permanent TransLoc™ mounting system, the sensors are permanently mounted on the outside of the pipe, eliminating any contact with the medium.

SITRANS FUT1010 is available in two different configurations; a version for liquid hydrocarbon applications and a version for precise gas measurement. Both versions are offered in pipe sizes ranging from 4 inch to 24 inch (DN 100 to DN 600) with flange ratings of ANSI Class 150/300/600 for liquid and 300/600 for gas.

Benefits

- Calibrated performance that meets custody transfer accuracy
- WideBeam® technology allows for precision flow measurement by reducing the meter's sensitivity to changes in the medium's physical properties
- TransLoc™ permanent mounting system ensures sealing and virtually no maintenance
- Available in a wide range of sizes
- High viscosity range (up to 2800 Cst)
- ZeroMatic Path™ capability automatically corrects for zero drift with no interruption of flow
- Completely cavity free design which eliminates any signal degrading buildup or ports to clog
- Large bi-directional flow range
- Modbus RTU RS 232/485 output available
- Dynamic Reynolds Number compensation

Application

Liquid applications		Gas applications	
Pipelines	Custody transfer, allocation, line balance, interface/densitometer	Upstream	Production wells, gathering, separation and dehydration
Terminals	Check metering, transmix metering, product identification	Midstream	Underground storage, transmission, compressor stations
Refineries	Process control, blending, tank measurement, ship loading and unloading	Downstream	Electric power generation, industrial use, gas processing plants
Transportation	Crude oil pipelines, LPG pipelines, multiple product pipelines, airport facilities, liquid terminals		
Downstream	Petrochemical and processing plants		

Design

SITRANS FUT1010 is available in two different configurations, both featuring the TransLoc mounting system:

- A version for liquid hydrocarbon applications
- A version for precise gas measurement

Transmitter

SITRANS FUT1010 is available with two, three or four paths and IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof enclosures.

Sensor

Available sizes include 4 to 24 inch (DN 100 to DN 600) with flange ratings of ANSI Class 150, 300 and 600 for the liquid meter and ANSI Class 300 and 600 for gas.

If the installation warrants, SITRANS FUT1010 can be delivered with a ten diameter upstream and five diameter downstream tubes and a flow conditioner.

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays readable up to 12 m (40 ft) away
- Current, voltage, status alarm, frequency and RS 232 outputs (see specification section for details)
- Analog inputs (see specification section for details)
- 1 MByte data logger with both site and data logger storage
- Standard or actual volume flow outputs
- Standard or actual totalize outputs
- Complete application and operation diagnostics, to ensure operational integrity
- Temperature provided by non-intrusive sensor ($\frac{3}{4}$ " tap available for insert temperature sensor)
- Detection of aeration or contamination

Flow Measurement

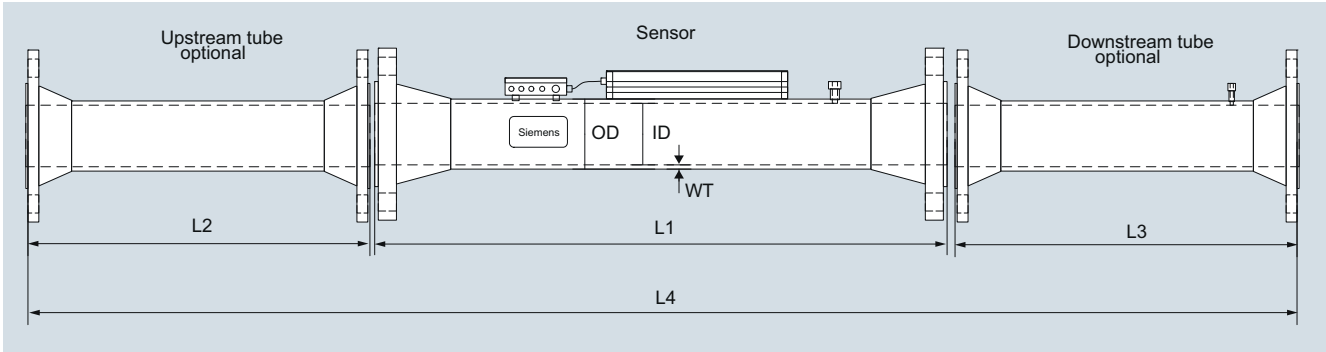
SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Technical specifications

Input			
Flow range (Gas)	± 36.5 m/s (± 120 f/s) for DN 100 ... DN 200 (4" ... 8") pipes bi-directional ± 30.5 m/s (± 100 ft/s) for DN 250 ... DN 600 (10" ... 24") pipes bi-directional	<u>Design Flow sensor</u>	Nominal pipe sizes 4" ... 24" (DN 100 ... DN 600)
Flow range (Liquid)	± 12 m/s (± 40 f/s) including zero flow, bi-directional	Pipe material specification	API 5L ERW
Flow sensitivity	0.0003 m/s (0.001 f/s) flow rate independent	Temperature tap	¾"
Flow temperature range	-28 ... +93 °C (-20 ... +200°F)	Pressure tap	¼"
Analogue inputs	4 x 4 ... 20 mA, (Programmable to Density, Pressure, viscosity or Temperature)	Flange class	• Liquid 150, 300, 600 • Gas 300, 600
Output		Flange specification	• ASME B16.5 • Liquid 150, 300, 600 • Gas 300, 600
Standard outputs	<ul style="list-style-type: none"> • 4x isolated 4 ... 20 mA, programmable • 2x 0 ... 10 V DC, programmable • 4x Digital Pulse outputs (2x open collector and 2x 0-5V TTL) One each for positive flow, one each for negative flow • Standard VT100 RS 232, Optional HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 	Flange facing	Raised face weld neck
Status/Alarm I/O	<ul style="list-style-type: none"> • Programmable, 4x Form C Relays • Clear Switch Input Totalizer Hold Switch Input 	Flange material	A105
Calibrated accuracy		Flow sensor paths	Two, three, or four
<u>Gas</u>		Sensor length	See diagram
2-path	0.5 ... 1.0 % (4" ... 6" < 0.25 %)	Design temperature	-28 ... +93 °C (-20 ... +200 °F)
3-path	< 0.5 %	Exterior finish	Marine/offshore grade per ASTM B117
4-path	< 0.2 %	Optional pipe sections	• 10 D upstream (with optional flow conditioner) • 5 D downstream
<u>Liquid</u>		Certificates and approvals	
2-path	0.5 ... 1.0 % (4" ... 6" < 0.15 %)	<u>Flow transmitter IP65 (NEMA 4X)</u>	
3-path	< 0.5 %	FM and CSA	• Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1 Ex II (1) G [Ex ia] IIC EX II 3 (1) G Ex nC [ia] IIC T5
4-path	< 0.15 %	ATEX	EMC 2004/108/EC ATEX 94/9/EC
Repeatability	± 0.05 ... 0.1 %	CE markings	
Data refresh rate		<u>Flow Transmitter - IP66 (NEMA 7)</u>	
Design		FM and CSA	• Transmitter Ex Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1 Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 Ex II 2 (1) G Ex d [ia] IIC] IIB + H2 T5
<u>Design Flow transmitter</u>		ATEX	EMC 2004/108/EC ATEX 94/9/EC
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"	CE markings	
Weight	see diagrams	<u>Sensor</u>	
Power supply		FM and CSA	I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W	ATEX	Ex II 1 G Ex ia IIC T5
Indication and operation		CE markings	EMC 2004/108/EC PED 97/23/EEC ATEX 94/9/EC
Data logger memory	1 MByte, programmable for all available data variables		
Display	128 x 240 pixel LCD with back-light		
Keypad	33 keypad buttons with tactile feedback		
Language options	English, Spanish, German, Italian, French		

Dimensional drawings



Length

Liquid Flange Class 150		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	19.7	285.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	19.7	285.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	19.7	285.0	B	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	254.5	10.02	19.7	285.0	B	2184.4	86.0	2545.1	100.2	1272.5	50.1	6008.4	236.55
304.8	12.0	323.9	12.75	304.8	12.0	19.7	285.0	B	2184.4	86.0	3048.0	120.0	1524.0	60.0	6762.8	266.25
406.4	16.0	406.4	16.0	387.4	15.25	19.7	285.0	B	2184.4	86.0	3873.5	152.5	1938.0	76.3	8002.3	315.05
457.2	18.0	457.2	18.0	438.2	17.25	19.7	285.0	B	2501.9	98.5	4381.5	172.5	2192.0	86.3	9081.8	357.55
508.0	20.0	508.0	20.0	489.0	19.25	19.7	285.0	B	2501.9	98.5	4889.5	192.5	2446.0	96.3	9843.8	387.55
609.6	24.0	609.6	24.0	590.6	23.25	19.7	285.0	B	2501.9	98.5	5905.5	232.5	2954.0	116.3	11367.8	447.55

Length

Liquid Flange Class 300		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	51.0	740.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	51.0	740.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	51.0	740.0	B	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	254.5	10.020	51.0	740.0	B	2184.4	86.0	2544.1	100.2	1272.5	50.1	6008.4	236.55
304.8	12.0	323.9	12.75	304.8	12.0	51.0	740.0	B	2184.4	86.0	3048.0	120.0	1524.0	60.0	6762.8	266.25
406.4	16.0	406.4	16.0	381.0	15.0	51.0	740.0	B	2184.4	86.0	3810.0	150.0	1905.0	75.0	7905.8	311.25
457.2	18.0	457.2	18.0	428.7	16.876	51.0	740.0	B	2501.9	98.5	4287.5	168.8	2143.8	84.4	8939.5	351.95
508.0	20.0	508.0	20.0	477.9	18.814	51.0	740.0	X42	2501.9	98.5	4777.7	188.1	2390.1	94.1	9676.1	380.95
609.6	24.0	609.6	24.0	574.7	22.626	51.0	740.0	X42	2501.9	98.5	5748.0	226.3	2872.7	113.1	11129.0	438.15

Length

Liquid Flange Class 600		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	96.6	1400.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	81.0	1175.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	193.7	7.625	102.1	1480.0	B	1828.8	72.0	1938.0	76.3	967.7	38.1	4740.9	186.65
254.0	10.0	273.1	10.75	247.7	9.75	82.8	1200.0	B	2184.4	86.0	2476.5	97.5	1239.5	48.8	5906.8	232.55
304.8	12.0	323.9	12.75	298.5	11.75	79.3	1150.0	B	2184.4	86.0	2984.5	117.5	1493.5	58.8	6668.8	262.55
406.4	16.0	406.4	16.0	373.1	14.688	82.8	1200.0	B	2184.4	86.0	3731.3	146.9	1864.4	73.4	7786.4	306.55
457.2	18.0	457.2	18.0	419.1	16.5	86.2	1250.0	B	2501.9	98.5	4191.0	165.0	2095.5	82.5	8794.8	346.25
508.0	20.0	508.0	20.0	466.8	18.376	82.8	1200.0	X42	2501.9	98.5	4668.5	183.8	2334.3	91.9	9511.0	374.45
609.6	24.0	609.6	24.0	560.4	22.064	77.6	1125.0	X42	2501.9	98.5	5603.2	220.6	2801.6	110.3	10913.1	429.65

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Length																
Gas Class 300		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	51.0	740.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	51.0	740.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	51.0	740.0	X42	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	254.5	10.020	51.0	740.0	X42	1828.8	72.0	2545.1	100.2	1272.5	50.1	5652.8	222.55
304.8	12.0	323.9	12.75	303.2	11.938	51.0	740.0	X42	1828.8	72.0	3032.8	119.4	1516.4	59.7	6384.3	251.35
406.4	16.0	406.4	16.0	381.0	15.0	51.0	740.0	X42	1981.2	78.0	3810.0	150.0	1905.0	75.0	7702.6	303.25
457.2	18.0	457.2	18.0	428.7	16.876	51.0	740.0	X42	1981.2	78.0	4287.5	168.8	2143.8	84.4	8418.8	331.45
508.0	20.0	508.0	20.0	477.9	18.814	51.0	740.0	B	1981.2	78.0	4777.7	188.1	2390.1	94.1	9155.4	360.45
609.6	24.0	609.6	24.0	574.7	22.626	51.0	740.0	B	1981.2	78.0	5748.0	226.3	2872.7	113.1	10608.3	417.65

Length																
Gas Class 600		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	102.1	1480.0	X42	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	96.6	1400.0	X42	1828.8	72.0	1541.8	60.7	769.9	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	87.9	1275.0	X42	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	247.7	9.75	102.1	1480.0	X42	1981.2	78.0	2476.5	97.5	1239.5	48.8	5703.6	224.55
304.8	12.0	323.9	12.75	298.5	11.75	94.8	1375.0	X42	1981.2	78.0	2984.5	117.5	1493.5	58.8	6465.6	254.55
406.4	16.0	406.4	16.0	381.0	15.0	75.9	1100.0	X42	1981.2	78.0	3810.0	150.0	1905.0	75.0	7702.6	303.25
457.2	18.0	457.2	18.0	428.7	16.876	75.9	1100.0	X42	1981.2	78.0	4287.5	168.8	2143.8	84.4	8418.8	331.45
508.0	20.0	508.0	20.0	477.9	18.814	75.9	1100.0	X42	1981.2	78.0	4777.7	188.1	2390.1	94.1	9155.4	360.45
609.6	24.0	609.6	24.0	574.7	22.626	72.4	1050.0	X42	1981.2	78.0	5748.0	226.3	2872.7	113.1	10608.3	417.65

SITRANS FUT1010 Liquid sizing chart

Nominal diameter		Q _{min}	Q _{max}	Q _{min}	Q _{max}
mm	inch	[m ³ /h]	[m ³ /h]	[42 GAL BBL/h]	[42 GAL BBL/h]
100	4	14	360	85	2267
150	6	29	818	180	5146
200	8	46	1417	290	8910
250	10	67	2233	421	14045
300	12	80	3203	504	20143
400	16	103	5172	651	32532
450	18	116	6618	728	41625
500	20	124	8241	778	51836
600	24	150	12022	945	75617

SITRANS FUT1010 Gas sizing chart

Pressure (psig)	SITRANS FUT1010 maximum flow rate (MMSCFD) [Millions of standard cubic feet per day]							
	Meter size and maximum velocity							
	4" 135 ft/s	6" 126 ft/s	8" 117 ft/s	10" 144 ft/s	12" 126 ft/s	16" 99 ft/s	20" 81 ft/s	24" 90 ft/s
100	8.2	17.3	27.9	54.1	67.1	83.3	107.1	174.9
200	15.5	32.9	52.9	102.7	127.6	158.2	203.4	332.3
300	23.1	49.0	78.7	152.8	189.8	235.4	302.6	494.5
400	30.9	65.5	105.3	204.4	253.9	315.0	404.8	661.5
500	39.0	82.6	132.8	257.6	320.0	396.9	510.1	833.6
600	47.3	100.1	161.0	312.4	388.0	481.2	618.5	1010.8
700	55.8	118.2	190.0	368.7	457.9	568.1	730.1	1193.1
800	64.6	136.8	219.8	426.6	529.9	657.3	844.8	1380.5
900	73.6	155.8	250.5	486.1	603.8	749.0	962.6	1573.1
1000	82.8	175.4	282.0	547.2	679.6	843.0	1083.5	1770.6
1100	92.3	195.4	314.1	609.6	757.1	939.2	1207.1	1972.7
1200	101.9	215.9	347.0	673.3	836.3	1037.4	1333.3	2178.9

Pressure (psig)	SITRANS FUT1010 maximum flow rate (MMSCFD) [Millions of standard cubic feet per day]							
	Meter size and maximum velocity							
	[Minimum flow rate above which 0.2 % accuracy can be maintained]							
4" 1.55 ft/s	6" 1.4 ft/s	8" 1.3 ft/s	10" 1.65 ft/s	12" 1.35 ft/s	16" 1.1 ft/s	20" 0.85 ft/s	24" 1 ft/s	
100	0.1	0.2	0.3	0.6	0.7	0.9	1.1	1.9
200	0.2	0.4	0.6	1.2	1.4	1.8	2.1	3.7
300	0.3	0.5	0.9	1.8	2.0	2.6	3.2	5.5
400	0.4	0.7	1.2	2.3	2.7	3.5	4.2	7.4
500	0.4	0.9	1.5	3.0	3.4	4.4	5.4	9.3
600	0.5	1.1	1.8	3.6	4.2	5.3	6.5	11.2
700	0.6	1.3	2.1	4.2	4.9	6.3	7.7	13.3
800	0.7	1.5	2.4	4.9	5.7	7.3	8.9	15.3
900	0.8	1.7	2.8	5.6	6.5	8.3	10.1	17.5
1000	1.0	1.9	3.1	6.3	7.3	9.4	11.4	19.7
1100	1.1	2.2	3.5	7.0	8.1	10.4	12.7	21.9
1200	1.2	2.4	3.9	7.7	9.0	11.5	14.0	24.2

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Pressure (barg)	SITRANS FUT1010 Maximum Flow Rate (Nm ³ /h x 1000)			[Thousands of normal cubic meters per hour]				
	DIN meter size and maximum velocity							
	100 mm	150 mm	200 mm	250 mm	300 mm	400 mm	500 mm	600 mm
	41.1 m/s	38.4 m/s	35.6 m/s	43.9 m/s	38.4 m/s	30.1 m/s	24.6 m/s	27.4 m/s
10	13.5	28.7	46.1	89.5	111.2	137.9	177.2	289.6
20	26.4	55.9	89.9	174.5	216.7	268.8	345.5	564.6
30	39.8	84.4	135.6	263.2	326.9	405.5	521.2	851.8
40	53.9	114.1	183.4	355.8	441.9	548.2	704.6	1151.4
50	68.5	145.0	233.1	452.4	561.9	697.0	895.9	1464.0
60	83.7	177.2	284.9	552.9	686.7	851.9	1094.8	1789.2
70	99.5	210.7	338.7	657.2	816.3	1012.6	1301.5	2126.9
80	115.8	245.3	394.3	765.1	950.2	1178.7	1514.9	2475.8
90	132.6	280.8	451.4	875.9	1087.8	1349.4	1734.3	2834.3
100	149.7	317.1	509.7	989.1	1228.5	1523.9	1958.6	3200.8
110	167.1	353.8	568.8	1103.8	1370.9	1700.6	2185.7	3571.9
120	184.5	390.8	628.2	1218.9	1514.0	1878.0	2413.7	3944.5

Pressure (barg)	SITRANS FUT1010 Transition Flow Rate (Nm ³ /h x 1000)			[Thousands of normal cubic meters per hour]				
	DIN meter size and maximum velocity			Minimum flow rate above which 0.2 % accuracy can be maintained				
	100 mm	150 mm	200 mm	250 mm	300 mm	400 mm	500 mm	600 mm
	0.47 m/s	0.42 m/s	0.39 m/s	0.50 m/s	0.41 m/s	0.33 m/s	0.25 m/s	0.30 m/s
10	0.2	0.3	0.5	1.0	1.2	1.5	1.9	3.2
20	0.3	0.6	1.0	2.0	2.3	3.0	3.6	6.3
30	0.5	0.9	1.5	3.0	3.5	4.5	5.5	9.5
40	0.6	1.3	2.0	4.1	4.7	6.1	7.4	12.8
50	0.8	1.6	2.6	5.2	6.0	7.7	9.4	16.3
60	1.0	2.0	3.2	6.3	7.4	9.5	11.5	19.9
70	1.1	2.3	3.8	7.5	8.7	11.3	13.7	23.6
80	1.3	2.7	4.4	8.8	10.2	13.1	15.9	27.5
90	1.5	3.1	5.0	10.0	11.7	15.0	18.2	31.5
100	1.7	3.5	5.7	11.3	13.2	16.9	20.6	35.6
110	1.9	3.9	6.3	12.6	14.7	18.9	22.9	39.7
120	2.1	4.3	7.0	14.0	16.2	20.9	25.3	43.8

Selection and Ordering data	Article No.	Order Code
SITRANS FUT1010 (Liquid)	7 ME3 6 2 - - - - - 0 - - - - -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Transmitter type		
No Transmitter	0	
IP65 NEMA 4X (2 path)	1	
IP65 NEMA 4X (2 path) with optional communications	2	
IP65 NEMA 4X (3 or 4 path)	3	
IP65 NEMA 4X (3 or 4 path) with optional communications	4	
IP66 NEMA 7 wall mount/explosionproof (2 Path)	5	
P66 NEMA 7 wall mount/explosionproof (2 Path) with optional communications	6	
P66 NEMA 7 wall mount/explosionproof (3 or 4 Path)	7	
P66 NEMA 7 wall mount/explosionproof (3 or 4 Path) lwith optional communications	8	
Input power		
90 ... 240 V AC	1	
9 ... 36 V DC	2	
Number of ultrasonic paths		
2 path	B	
3 path	C	
4 path	D	
Pipe size		
DN 100 (4") (Dual Path only)	A	
DN 150 (6")(Dual Path only)	B	
DN 200 (8")	C	
DN 250 (10")	D	
DN 300 (12")	E	
DN 400 (16")	F	
DN 450 (18")	G	
DN 500 (20")	H	
DN 600 (24")	J	
Flange rating		
Class 150 (Raised Face)	0	
Class 300 (Raised Face)	1	
Class 600 (Raised Face)	2	
Upstream/downstream meter run		
None	0	
10 pipe diameter upstream Tube only	1	
10 pipe diameter upstream Tube with flow conditioner	2	
5 pipe diameter downstream tube only	3	
10D up <u>and</u> 5D downstream tubes	4	
10D up <u>and</u> 5D downstream tubes with flow conditioner	5	
Liquid type range (select closest match)		
Water	A	
Multiple Crude Oils	B	
Light Crude only	C	
Heavy Crude only	D	
Multiple Finished Products	E	
Gasolines Only	F	
Kerosene	G	
Jet Fuel	H	
Diesel	J	
Multiple Fuel Oils	K	
Heavy Fuel Oils	L	
Liquified Gases	M	
Liquid temperature range		
-28 ... +65 °C (-20 ... +150 °F)	A	
1 ... 93 °C (30 ... 200 °F)	B	
Transmitter and sensor approval		
FM/CSA, CE	1	
ATEX and PED, CE, C-TICK	2	

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable assembly for flow sensor (add one K.. per flow path)	
• Cable and termination for one sensor path (see "Sensor cable chart for options")	K..
• Termination for user supplied cable	T01
Cable assembly for temperature sensor (only 1 required)	
• Cable and termination for temperature sensor (see "Transducer cable chart for options").	R..
• Termination for user supplied RTD cable	T31
Nace Certification	
• Nace, Spool only	C10
• Nace, W/10D upstream	C11
• Nace, W/10D upstream, cond	C12
• Nace, W/5D downstream	C13
• Nace, W/10D up, 5D dn	C14
• Nace, W/10D up, cond, 5D dn	C15
Standard Cal: Oil (2 cst), Forward flow direction, 6 points, 6 verification points, Range 2 ... 20 ft/sec, Lab pressure and temperature	
• Calibration, 100 DN (4 inch)	D10
• Calibration, 150 DN (6 inch)	D11
• Calibration, 200 DN (8 inch)	D12
• Calibration, 250 DN (10 inch)	D13
• Calibration, 300 DN (12 inch)	D14
• Calibration, 400 DN (16 inch)	D15
• Calibration, 450 DN (18 inch)	D16
• Calibration, 500 DN (20 inch)	D17
• Calibration, 600 DN (24 inch)	D18
• Calibration, Other contact factory for quote	Y28
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19

Selection and Ordering data	Article No.
Operating Instructions for SITRANS FUT1010 (Liquid)	
English NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E02639184
German NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E03086468

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Article No.	Order Code
SITRANS FUT1010 (Gas)	7 ME 3 6 3 - - - - - - - - - - - 0 - - - - - - - - - -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Transmitter type		
No meter	0	
IP65 NEMA 4X (2 path)	1	
IP65 NEMA 4X (2 path) with Modbus	2	
IP65 NEMA 4X (3 or 4 path)	3	
IP65 NEMA 4X (3 or 4 path) with Modbus	4	
IP66 NEMA 7 wall mount flame/explosion proof (2 Path)	5	
IP66 NEMA 7 wall mount flame/explosion proof (2 Path) with Modbus	6	
IP66 NEMA 7 wall mount flame/explosion proof (3 or 4 Path)	7	
IP66 NEMA 7 wall mount flame/explosion proof (3 or 4 Path) with Modbus	8	
Input power		
90 ... 240 V AC	1	
9 ... 36 V DC	2	
Number of ultrasonic paths		
2 path (standard enclosure material)	B	
3 path (standard material)	C	
4 path (standard material)	D	
Pipe size		
DN 100 (4") (Dual Path only)	A	
DN 150 (6")(Dual Path only)	B	
DN 200 (8")	C	
DN 250 (10")	D	
DN 300 (12")	E	
DN 400 (16")	F	
DN 450 (18")	G	
DN 500 (20")	H	
DN 600 (24")	J	
Flange rating		
Class 300 (Raised Face)	1	
Class 600 (Raised Face)	2	
Upstream/downstream meter run		
None	0	
10 pipe diameter upstream Tube only	1	
10 pipe diameter upstream Tube with flow conditioner	2	
5 pipe diameter downstream tube only	3	
10D up <u>and</u> 5D downstream tubes	4	
10D up <u>and</u> 5D downstream tubes with flow conditioner	5	
Gas type range (select closest match)		
Natural Gas (mostly CH ₄)	A	
Process Gases (N ₂ , O ₂ , CO, Ar)	B	
Helium	C	
Hydrogen	D	
Gas temperature range		
-28 ... +65 °C (-20 ... +150 °F)	A	
1 ... 93 °C (30 ... 200 °F)	B	
Transmitter and sensor approval		
FM/CSA, CE	1	
ATEX and PED, CE, C-TICK	2	

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable assembly for flow sensor (Add one K.. per flow path)	
• Cable and termination for one sensor path (see "Transducer cable chart for options")	K..
• Termination for user supplied cable	T01
Cable assembly for temperature sensor (only 1 required)	
• Cable and termination for temperature sensor (see "Transducer cable chart for options").	R..
• Termination for user supplied RTD cable	T31
Nace Certification	
• Nace, Spool only	C10
• Nace, W/10D upstream	C11
• Nace, W/10D upstream, cond	C12
• Nace, W/5D downstream	C13
• Nace, W/10D up, 5D dn	C14
• Nace, W/10D up, cond, 5D dn	C15
Standard Cal: Nat Gas, Forward flow direction, 7 points, 2 verification points, Range 10 ... 100 ft/sec, Lab pressure and temperature	
• Calibration, 100 DN (4 inch)	D10
• Calibration, 150 DN (6 inch)	D11
• Calibration, 200 DN (8 inch)	D12
• Calibration, 250 DN (10 inch)	D13
• Calibration, 300 DN (12 inch)	D14
• Calibration, 400 DN (16 inch)	D15
• Calibration, 450 DN (18 inch)	D16
• Calibration, 500 DN (20 inch)	D17
• Calibration, 600 DN (24 inch)	D18
• Calibration, Other contact factory for quote	Y28
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19













Selection and Ordering data	Article No.
Operating Instructions for SITRANS FUT1010 (Gas)	
English NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E02639185
German NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E03086485

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>










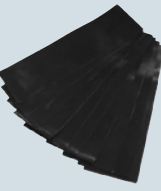

Accessories/Spare parts for clamp-on ultrasonic flowmeters

Description	Article No.		Description	Article No.	
Universal Portable Sensors Selected generally for portable systems where a wide variety of pipes are to be measured. Since they are selected based on diameter only, a wide range of pipe sizes and materials can be covered with a minimum number of sensors. These can also be selected as a cost savings on applications where standard accuracy is sufficient.	7ME3951-...		Mounting Frames These items are useful in simplifying sensor installation. They are strapped to the pipe first then the sensors are installed, making the installation less cumbersome and more precise. They also enable easy repeated mounting of the sensors assuring conformation to the original sensor positioning. They may be left in place at each measurement location where periodic flow surveys are conducted to simplify subsequent installations and ensure repeatable results.	7ME3960-...	
High Precision Sensors Selected generally for dedicated meters since the need to cover a range of pipes is not a requirement. They provide the highest accuracy achievable by the meters and therefore should be selected whenever higher accuracy/repeatability is required. They are only applicable to steel pipes but no other metals, and are selected solely by wall thickness.	7ME3950-...		Spacer Bars Sensors are required to be mounted at a set distance from each other as determined by pipe size and medium being measured. The spacer bar simplifies this requirement by eliminating the need to undertake a precise dimensional measurement. The flowmeter will specify a specific spacing index which is easily accommodated with the marked indices on the bar.	7ME3960-...	
High Temperature Sensors Are selected whenever pipe temperature will exceed 250 °F (120 °C) up to a maximum of 450 °F (232 °C). They are universal type and can therefore be used on any pipe material and are selected by pipe diameter. Made with stainless steel construction.	7ME3950-...		Clamp-On RTD's 1000 Ω platinum RTD's for use where temperature is required. Used with Energy Meters to record supply/return temperature. For this purpose precision matched pairs (to 0.02 °C) are supplied. Single RTD's are also used with SITRANS FUH and SITRANS FUG meters to enable live calculations of "Liquid" and Standard Volume Correction.	7ME3950-...	
High Precision Mount These provide the most secure and strongest mounting of the flow sensors. They are generally selected for "High End" meter types where maximum performance criteria applies. They accommodate high precision sensors designed to mount inside these enclosures. May be welded to the pipe if so desired by the customer. They come in 2-piece or 1-piece configurations depending upon the application pipe size and type (Liquid/Gas).	7ME3960-...		Insert RTD's Are identical to clamp-on RTD's as described above except that they are inserted into the pipe (In a Thermowell). They provide more precise and quicker responding temperature measurement. They are selected when precise temperature measurement of the actual liquid or gas is required as opposed to pipe "skin temperature". Since they project into the pipe they cannot be used in pipeline that undergo periodic "pigging".	7ME3950-...	
Mounting tracks Typically used on smaller pipes for easier and more stable mounting for dedicated universal style sensor size A or B, also available for dedicated high precision sensor size A or B.	7ME3960-...		Standard Cable (Flow Sensor or RTD) Selected for general purpose installations where no special application requirements exist.	7ME3960-...	
Magnetic mounting frames Magnetic mounting frames are designed to simplify clamp-on sensor installation on pipelines 8 inches (DN 200) and larger by eliminating the need for straps to secure them. They feature powerful magnets to ensure quick and accurate setup. Compatible with all C, D and E universal and high-precision sensors belonging to the SITRANS F US clamp-on family, magnetic mounting frames can be installed on any carbon steel pipe and are constructed in aluminum for a high level of durability.	7ME3960-0MD02		Submersible Cable (Flow Sensor) Polyethylene jacketed, for locations that experience periodic or continual submersion of the flow sensors.	7ME3960-...	

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Description	Article No.		Description	Article No.	
Plenum Cable (Flow Sensor or RTD) For temperatures above 180 °F. Teflon jacketed to withstand high temperatures, is used when high temp sensors are specified.	7ME3960-...		Test Block Used for checking operation of a meter and sensors prior to a field installation, or as a troubleshooting tool. Selected by sensor size, each block accommodates 2 sensor sizes. Available only for universal sensors.	7ME3960-...	
Armored Cable (Flow Sensor) Double shielded cable, selected when cable will not be installed in conduit between meter and sensors.	7ME3960-...		Termination Kit (Flow Sensor or RTD) Provides the connectors, labels and shrink tubing or other associated hardware to complete the termination of a specific cable type. These can be provided in cases where users will be purchasing bulk cable directly and cutting to length at their site, or when existing cable length is to be altered. Selected by cable type.	7ME3960-...	
Temperature sensor cable Cable to connect field installed RTD to flow meter, available in Teflon wrapped, plenum or submersible grade. Typically used for SITRANS FUE, FUH and FUG series meters where a temperature sensor is employed.	7ME3960-...		Cable Gland Kit Cable gland kit for use with SITRANS FUS1010, FUH1010 and FUG1010 Ultrasonic Flowmeters housed in IP65 NEMA 4X wall mount enclosures. Kit contains a total of 5 glands to manage and seal the exit and entry of wires and cables to ancillary devices.	A5E32834162	
Straps Used to fasten sensors or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	7ME3960-...				
Chains (EZ clamps) Used to fasten portable sensors or mounting frames to pipe. Thumbscrews eliminate need for hand tools when mounting sensors, and allow for easy on/off operations.	7ME3960-...				
Ultrasonic Couplant Fills any voids between sensor emitting surface and pipe wall to allow maximum energy transfer between sensor and pipe. Several different types of couplants are employed as determined by the application conditions and type of installation (Temporary or permanent).	7ME3960-...				
Dry Couplant The dry coupling pad is intended for use in any liquid, clamp-on transit time or Doppler applications that require a more durable coupling material. Installation is easy by simply placing one strip of material between sensor and pipe. Not intended for clamp-on gas where damping material is used. The temperature range is -34 to +200 °C (-30 to +392 °F).	7ME3960-...				
Damping Material Used with gas meters, and required as part of their sensor installation. This material absorbs excess ultrasonic energy from the pipe wall to enable the meter to detect and operate with low amplitude sensor signals normally associated with Clamp-on Gas applications.	7ME3960-...				

Selection and Ordering data	Article No.
<i>Spare parts (System)</i>	
SITRANS F US clamp-on	7ME3940 - ■■■■
Power supplies, batteries and chargers	
Power supply 90 ... 240 V AC	
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof	0 PA 00
• for IP65 (NEMA 7) compact explosionproof	2 PA 00
Power supply 9 ... 36 V DC	
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA7) wall mount explosionproof	0 PB 01
• negative ground for NEMA 7 compact explosionproof	2 PJ 00
• positive ground for NEMA 7 compact explosionproof	2 PK 00
Portable meter batteries and accessories	
• Internal battery (Portable meters only)	3 PP 00
IP67 Portable meter charger	
• Type A for Europe (CEE7/7)	3 PC 00
• Type C for Australia (AS3112)	3 PD 00
• Type D for UK (BS1363)	3 PE 00
• Type J for Japan (JIS8303)	3 PF 00
• Type K for US (NEMA 5-15P)	3 PG 00
• Type L for Switzerland (SEV1011)	3 PH 00
IP40 Portable meter charger	
• Type A for Europe (CEE7/7)	4 PC 00
• Type C for Australia (AS3112)	4 PD 00
• Type D for UK (BS1363)	4 PE 00
• Type J for Japan (JIS8303)	4 PF 00
• Type K for US (NEMA 5-15P)	4 PG 00
• Type L for Switzerland (SEV1011)	4 PH 00
Modbus system computer modules	
Communication Module W/VT100 RS232, BACnet MSTP / BACnet IP, Ethernet IP, Modbus RTU / TCP/IP, Johnson N2	A5E32589005
Mounting kit (Meter functions) for Communication module	CQO:1015N-5M-MK1
Mounting kit (type 2) for Communication module	CQO:1015N-5M-MK2
Mounting kit (type 3) for Communication module	CQO:1015N-5M-MK3
Field configuration kit with manual, for Modbus converter module	CQO:1015N-5M-FK1
Pipe mounting brackets	
2 inch pipe mounting bracket for IP65 (NEMA 7) compact explosionproof	CQO:1012XMB-1
2 inch pipe mounting bracket for IP65 (NEMA 4X) wall mount	CQO:1012NMB-1

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Sensors)</i>		<i>Spare parts (Sensors)</i>	
SITRANS F US clamp-on		SITRANS F US clamp-on	
Meter type		Meter type	
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	7ME 3 9 5 0 - ■■■■	Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	7ME 3 9 5 0 - ■■■■
Portable (SITRANS FUP1010 or FUE1010)	7ME 3 9 5 1 - 0 ■■■■	Portable (SITRANS FUP1010 or FUE1010)	7ME 3 9 5 1 - 0 ■■■■
Approvals		<u>For gas flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUG1010 section</u>	
UL, ULc, CE (Portable only) ¹⁾	0	<u>High precision gas flow sensors for use with mounting frames or tracks</u>	
FM/CSA hazardous (classified) locations ¹⁾	1	B1H (high precision) ²⁾	GK 0
ATEX Ex II 1G Ex ia IIC T5 (not for RTDs) ¹⁾	2	B2H (high precision) ²⁾	GL 0
Temperature range (High Precision Sensors)		B3H (high precision) ²⁾	GT 0
Standard temperature: -40 ... +65 °C (-40 ... 150 °F)	0	C1H (high precision) ²⁾³⁾	GM 0
High temperature T2: -1 ... 104 °C (30 ... 220 °F)	2	C2H (high precision) ²⁾³⁾	GN 0
High temperature T3: 32 ... 121 °C (90 ... 250 °F)	3	D1H (high precision) ²⁾³⁾	GP 0
Spare sensor code		D2H (high precision) ²⁾³⁾	GQ 0
<u>For liquid flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUS1010 section</u>		D3H (high precision) ²⁾³⁾	GU 0
<u>Liquid flow sensors for use with mounting frames or tracks (including portable)</u>		D4H (high precision) ²⁾³⁾	GR 0
A2 universal	LB 0 0	<u>Standard RTD sensors (not for energy systems)</u>	
B3 universal	LC 0 0	Standard clamp-on RTD	1TA 0 0
C3 universal ³⁾	LD 0 0	Submersible clamp-on RTD (not for Portable)	1TB 0 0
D3 universal ³⁾	LE 0 0	Insertion style RTD each (size 1), 140 mm (5.5 inch)	1TJ 0 0
E2 universal ³⁾	LF 0 0	Insertion style RTD each (size 2), 216 mm (8.5 inch)	1TJ 0 1
A1H (high precision)	LG 0 0	Insertion style RTD each (size 3), 292 mm (11.5 inch)	1TJ 0 2
A2H (high precision)	LH 0 0	Insertion style RTD each (size 4), 368 mm (14.5 inch)	1TJ 0 3
A3H (high precision)	LJ 0 0	<u>Standard for energy system (matched pair)</u>	
B1H (high precision)	LK 0	Standard clamp-on RTD with mounting	1TA 1 0
B2H (high precision)	LL 0	Insertion style RTD pair (size 1) for SITRANS FUE1010, 140 mm (5.5 inch)	1TJ 1 0
B3H (high precision)	LT 0	Insertion style RTD pair (size 2) for SITRANS FUE1010, 216 mm (8.5 inch)	1TJ 1 1
C1H (high precision) ³⁾	LM 0	Insertion style RTD pair (size 3) for SITRANS FUE1010, 292 mm (11.5 inch)	1TJ 1 2
C2H (high precision) ³⁾	LN 0	Insertion style RTD pair (size 4) for SITRANS FUE1010, 368 mm (14.5 inch)	1TJ 1 3
D1H (high precision) ³⁾	LP 0		
D2H (high precision) ³⁾	LQ 0		
D3H (high precision) ³⁾	LU 0		
D4H (high precision) ³⁾	LR 0		
Doppler, for up to 121 °C (250 °F)	LS 0 0		
<u>High temperature universal liquid sensors</u>			
High temp. sensor size 1 for up to 230 °C (12.7 to 100 mm diam.)	LA 1 0		
High temp. sensor size 2 for up to 230 °C (30 to 200 mm diam.)	LA 2 0		
High temp. sensor size 3 for up to 230 °C (150 to 600 diam.)	LA 3 0		
High temp. sensor size 4 for up to 230 °C (400 to 1200 diam.)	LA 4 0		

¹⁾ Products are marked with CE as required by European directive.

²⁾ T3 range not available.


³⁾ Made with stainless steel construction.



Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME 3 9 6 0 - ■■■■	SITRANS F US clamp-on	7ME 3 9 6 0 - ■■■■
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Meter design		Stainless steel straps for weld seal enclosure mounting (2 x required for dual enclosures)	
IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof	0	<ul style="list-style-type: none"> Mounting strap for pipe diameter to 300 mm (13 inch) 	0 SM 0 1
IP65 (NEMA 7) compact	2	<ul style="list-style-type: none"> Mounting strap for pipe diameter to 600 mm (24 inch) 	0 SM 1 1
IP67 weatherproof portable	3	<ul style="list-style-type: none"> Mounting strap for pipe diameter to 1200 mm (48 inch) 	0 SM 2 1
IP40 (NEMA 1) Energy Portable	4	<ul style="list-style-type: none"> Mounting strap for pipe diameter to 1500 mm (60 inch) 	0 SM 3 1
Dedicated sensor mounting hardware		<ul style="list-style-type: none"> Mounting strap for pipe diameter to 2130 mm (84 inch) 	0 SM 4 1
Sensor mounting tracks (aluminium with mounting straps) for pipes < 125 mm (5 inch)		<ul style="list-style-type: none"> Mounting strap for pipe diameter to 3050 mm (120 inch) 	0 SM 5 1
<ul style="list-style-type: none"> Universal sensor size A or B 	0 MA 0 0	Stainless mounting tracks for high temp 991 sensors, with straps	
<ul style="list-style-type: none"> High precision sensor size A or B 	0 MB 0 0	<ul style="list-style-type: none"> Size 1 high temp sensor pair 	CQO:992MTNHMSH-1
Sensor mounting frames for		<ul style="list-style-type: none"> Size 2 high temp sensor pair 	CQO:992MTNHMSH-2
<ul style="list-style-type: none"> Universal sensor size B (for pipes > 125 mm (5 inch)) 	CQO:1012FN-PB	<ul style="list-style-type: none"> Size 3 high temp sensor pair 	CQO:992MTNHMSH-3
<ul style="list-style-type: none"> Universal sensor size C 	0 MC 0 0	<ul style="list-style-type: none"> Size 4 high temp sensor pair 	CQO:992MTNHMSH-4
<ul style="list-style-type: none"> Universal sensor size D 	0 MC 0 1	Clamp-on RTD mounting hardware for dedicated systems	
<ul style="list-style-type: none"> Universal sensor size E 	0 MC 0 2	<ul style="list-style-type: none"> RTD mounting hardware for dedicated system: 152 to 610 mm (6 to 24 inch) 	0 MR 0 0
<ul style="list-style-type: none"> High precision sensor size B (for pipes > 125 mm (5 inch)) 	CQO:1012FNH-PB	<ul style="list-style-type: none"> RTD mounting hardware for dedicated system: 12.7 to 50.8 mm (0.5 to 2 inch) 	0 MR 0 1
<ul style="list-style-type: none"> High precision sensor size C 	0 MD 0 0	<ul style="list-style-type: none"> RTD mounting hardware for dedicated system: 31.8 to 203.2 mm (1.25 to 8 inch) 	0 MR 0 2
<ul style="list-style-type: none"> High precision sensor size D 	0 MD 0 1	<ul style="list-style-type: none"> RTD mounting hardware for dedicated system: 508 to 1219 mm (20 to 48 inch) 	0 MR 0 4
Mounting straps for mounting frames (slotted stainless steel)		<ul style="list-style-type: none"> Junction box for clamp on RTD's 	CQO:992ECJ
<ul style="list-style-type: none"> For pipes from DN 50 to DN 150 	0 SM 0 0	Portable sensor mounting hardware	
<ul style="list-style-type: none"> For pipes from DN 50 to DN 300 	0 SM 1 0	Sensor mounting tracks for portable sensors (aluminum with mounting chains) for pipes < 125 mm (5 inch) for	
<ul style="list-style-type: none"> For pipes from DN 300 to DN 600 	0 SM 2 0	<ul style="list-style-type: none"> Universal sensor size A or B 	3 MA 0 0
<ul style="list-style-type: none"> For pipes from DN 600 to DN 1200 	0 SM 3 0	<ul style="list-style-type: none"> High precision sensor size A or B 	3 MB 0 0
<ul style="list-style-type: none"> For pipes from DN 1200 to DN 1500 	0 SM 4 0	Sensor mounting frames	
<ul style="list-style-type: none"> For pipes from DN 1500 to DN 2100 	0 SM 5 0	<ul style="list-style-type: none"> Universal sensor size B (for pipes > 125 mm (5 inch)) 	CQO:1012FP-PB
<ul style="list-style-type: none"> For pipes from DN 2100 to DN 3000 	0 SM 6 0	<ul style="list-style-type: none"> Universal sensor size C 	3 MC 0 0
Spacer bars (for indexing sensors on pipe)		<ul style="list-style-type: none"> Universal sensor size D 	3 MC 0 1
<ul style="list-style-type: none"> Spacer bars for pipes to 200 mm/8 inch (liquid), 600 mm/24 inch (gas) 	0 MS 1 0	<ul style="list-style-type: none"> Universal sensor size E 	3 MC 0 2
<ul style="list-style-type: none"> Spacer bars for pipes to 500 mm/20 inch (liquid), DN 1200/48 inch (gas) 	0 MS 2 0	<ul style="list-style-type: none"> High precision sensor size B (for pipes > 125 mm (5 inch)) 	CQO:1012FPH-PB
<ul style="list-style-type: none"> Spacer bars for pipes to 800 mm/32 inch (liquid) 	0 MS 3 0	<ul style="list-style-type: none"> High precision sensor size C 	3 MD 0 0
<ul style="list-style-type: none"> Spacer bars for pipes to 1200 mm/48 inch (liquid) 	0 MS 4 0	<ul style="list-style-type: none"> High precision sensor size D 	3 MD 0 1
<ul style="list-style-type: none"> Only use in conjunction with 7ME3960-0MS30 		Spacer bar (for indexing portable sensors)	3 MS 0 0
High precision mounting enclosures for liquid and gas sensors		Mounting chain and EZ clamp hardware	
<ul style="list-style-type: none"> Stainless steel mounts for high precision size "C" sensors, single Enclosure 	0 WS 5 0		
<ul style="list-style-type: none"> Stainless steel mounts for high precision size "D/E" sensors, single Enclosure 	0 WS 6 0		
<ul style="list-style-type: none"> Stainless steel mounts for high precision size "C" sensors, dual Enclosure 	0 WD 5 0		
<ul style="list-style-type: none"> Stainless steel mounts for high precision size "D/E" sensors, dual enclosure 	0 WD 6 0		

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME3960 - 
<ul style="list-style-type: none"> EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch); handles all transducers except "D" size HP and "E" size univ. 	CQO:1012Z-1
<ul style="list-style-type: none"> EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch) for "D" size HP and "E" size universal 	CQO:1012Z-2
<ul style="list-style-type: none"> Mounting chain for portable sensors: 4 x 760 mm lengths 	3CM10
<ul style="list-style-type: none"> Mounting chain for portable sensors: 2 x 760 mm and 2 x 1500 mm lengths 	3CM20
RTD mounting hardware for portable system	3MR00
Sensor connector adaptors	
<ul style="list-style-type: none"> "F" connector to BNC adapter (order 2 per sensor set) 	CQO:1012NFPA

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME 3 9 6 0 - 	SITRANS F US clamp-on	7ME 3 9 6 0 - 
Insert RTD Thermowells		Ultrasonic couplants	
<ul style="list-style-type: none"> Thermowell std. duty uninsulated pipe 140 mm (5.5 inch) CQO:1012TW-1 Thermowell std. duty uninsulated pipe 216 mm (8.5 inch) CQO:1012TW-2 Thermowell std. duty uninsulated pipe 292 mm (11.5 inch) CQO:1012TW-3 Thermowell std. duty with lagging 140 mm (5.5 inch) CQO:1012TW-1L Thermowell std. duty with lagging 216 mm (8.5 inch) CQO:1012TW-2L Thermowell std. duty with lagging 292 mm (11.5 inch) CQO:1012TW-3L 		<ul style="list-style-type: none"> Temporary water based for portable systems: 350 ml (12 oz): -34 ... +38 °C (-30 ... +100 °F) 0 UC 1 0 Permanent synthetic polymer based: 90 ml (3 oz) -40 ... +190 °C (-40 ... +375 °F) 0 UC 2 0 Permanent high temp fluoroether: -40 ... +230 °C (-40 ... +450 °F) 0 UC 3 0 	
Sensor cables for (Use "Sensor cable selection chart" to complete Article No. with ##)		<ul style="list-style-type: none"> Permanent vulcanizing silicone rubber couplant: 90 ml (3 oz): -40 ... +120 °C (-40 ... +250 °F) CQO:CC112 Permanent high temp silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F) CQO:CC117 Permanent high temp silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F) CQO:CC117A Couplant for submersible sensor applications CQO:CC120 Dry coupling pads (qty of 10): -34 to +200 °C (-30 to +392 °F) 0 UC 4 0 	
<ul style="list-style-type: none"> IP65 (NEMA 4X) wall mount or IP 66 (NEMA 7) wall mount explosionproof 0 CK ## IP65 (NEMA 7) compact explosionproof 2 CK ## IP67 Weatherproof portable 3 CK ## IP40 (NEMA 1) Portable 4 CK ## 		Pipe damping films for SITRANS FUG gas systems (For one pair of sensors)	
RTD cables for (Use "Sensor cable selection chart" to complete Article No. with ##)		<ul style="list-style-type: none"> B1, B2, B3, C1 and C2 sensors 0 DM 1 0 D1 and D3 sensors 0 DM 2 0 D2 sensor 0 DM 3 0 D4 sensor 0 DM 4 0 	
<ul style="list-style-type: none"> All dedicated systems 0 CR ## IP67 Weatherproof portable 3 CR ## IP40 (NEMA 1) Portable 4 CR ## 		Serial RS 232 Cables and I/O Adapters	
Dedicated cable termination kits		<ul style="list-style-type: none"> RS 232 Cable for all dedicated meters except FST020 0 CS 0 0 RS 232 Cable for IP66 weatherproof portable meter 3 CS 0 0 RS 232 Cable for FUP1010 IP40 Portable meter and FST020 4 CS 0 0 I/O adapter for IP66 Weatherproof portable meter 3 AD 0 0 	
<ul style="list-style-type: none"> Standard, plenum and armored sensor cable (NEMA 4X wall mount and NEMA 7 wall mount explosionproof) 0 CT 0 1 Submersible sensor cable (NEMA 4X wall mount and NEMA 7 wall mount explosionproof) 0 CT 1 1 Standard and plenum sensor cable (SITRANS FST020) 1 CT 0 1 Standard, plenum and armored sensor cable (NEMA 7 compact explosionproof) 2 CT 0 1 Submersible sensor cable (NEMA 7 compact explosionproof) 2 CT 1 1 Clamp-on RTD cable termination kit for standard RTD 0 CT 2 1 Clamp-on RTD cable termination kit for submersible RTD 0 CT 3 1 Insert RTD cable termination kit 0 CT 4 1 		Universal Sensor Test Blocks	
Cable gland kit for IP65 NEMA 4X enclosures A5E32834162		<ul style="list-style-type: none"> Test block for size A and B universal sensors 0 TB 1 0 Test block for size C and D universal sensors 0 TB 2 0 	
		Field Manuals	
		<ul style="list-style-type: none"> CD with documentation for SITRANS F US Clamp-on ultrasonic flowmeters (English) A5E02830664-03 	

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Sensor cable selection chart (Dedicated, pair)

Sensor cable codes for length and type options				
Cable length m (ft)	Standard	Submersible	Plenum	Armored
	-40 ... +80 °C (-40 ... +176 °F)	-40 ... +80 °C (-40 ... +176 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +80 °C (-40 ... +176 °F)
Order code				
6 (20)	K01	K11	K21	K31
15 (50)	K02	K12	K22	K32
30 (100)	K03	K13	K23	K33
46 (150)	K04	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

Sensor cable selection chart (SITRANS FUP1010, FUE1010 Portable, pair)

Sensor cable codes for length and type options		
Cable length m (ft)	Standard	Plenum
	-40 ... + 80 °C (-40 ... +176 °F)	-40 ... + 200 °C (-40 ... +392 °F)
Order Code		
6 (20)	K01	K21
15 (50)	K02	K22
30 (100)	K03	K23

RTD cable selection chart (Dedicated, each)

RTD cable codes for length and type				
Cable length m (ft)	Standard	Submersible	for insert RTD	for submersible insert RTD
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code				
6 (20)	R01	R11	R21	R31
15 (50)	R02	R12	R22	R32
30 (100)	R03	R13	R23	R33
46 (150)	R04	R14	R24	R34
61 (200)	R05	R15	R25	R35
91 (300)	R06	R16	R26	R36

RTD cable selection chart

RTD cable codes for length and type options		
Cable length m (ft)	IP67, FUP1010	IP40, FUE1010
	-40 ... + 200 °C (-40 ... +392 °F)	-40 ... + 200 °C (-40 ... +392 °F)
Order Code		
6 (20)	R11	R01
15 (50)	R12	R02
30 (100)	R13	R03

Overview

SITRANS F X vortex flowmeters provide accurate volumetric and mass flow measurement of steam, gases and liquids as an all-in-one solution with integrated temperature and pressure compensation.

Benefits

- 2-wire technology with HART communication
- Integrated temperature compensation for saturated steam as standard feature
- Integrated temperature and pressure compensation enabling direct measurement of mass, standard volume flow rate and energy
- One instrument for measuring pressure, temperature and flow. No additional installation of pressure and temperature sensors
- Maximum process reliability thanks to Intelligent Signal Processing (ISP) - stable readings, free of external disturbances
- Fully welded stainless steel construction with high corrosion, pressure and temperature resistance
- Maintenance-free design
- Ready to use due to plug & play feature
- Minimal pressure drop
- Compact or remote design
- Free Air Delivery (FAD) measurement of a compressor






Application

The SITRANS FX300 is a flowmeter in a single or dual transmitter version, suitable for measuring industrial steam, gases, as well as conductive and non-conductive liquids, e.g. steam (saturated steam, superheated steam), industrial gases (compressed air, nitrogen, liquefied gases, flue gases), and conductive and non-conductive liquids (demineralized water, boiler feed water, solvents, heat transfer oil).

The main applications of SITRANS FX300 can be found in the following sectors:

- Chemical
- Petrochemical
- Oil & Gas
- Power plants
 - Air
 - Heating
 - Cooling
 - Chilling
- Food & beverage
 - Pharmaceutical
 - Sugar refineries
 - Dairies
 - Breweries
 - Production of soft drinks
- Pulp & paper
- Water & waste water

System Overview

Version	Flange	Sandwich	Dual transmitter
Compact			
Remote			

Design

The unit is available in compact or remote version with up to 15 meter cable length.

Function**Operating Principle**

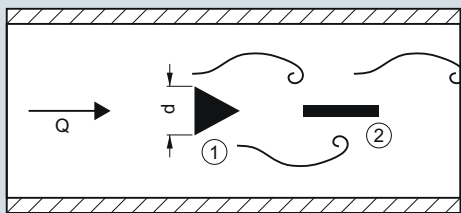
SITRANS F X vortex flowmeters measure flow rate by detecting the frequency at which alternating vortices are shed from a bluff body inserted into the flow stream. This principle of measurement is derived from the Karman phenomenon of vortex shedding. The frequency of the alternating vortices is proportional to the flow rate.

The passage of a vortex causes a slight stress on a pick-up sensor placed downstream of the bluff body. The stress is detected by piezo-electric crystals placed inside the pick-up sensor.

Flow Measurement

SITRANS F X

SITRANS FX300



① = Bluff Body, ② = Pick-up

The flowmeter calculates the flow velocity using the following equation:

$$Q = A \cdot V = A \cdot d / St \cdot f = 101.93 \cdot f / K \text{ [m}^3\text{/h]}$$

Where:

Q = flow rate [m³/h]

f = vortex shedding frequency [Hz]

K = calibration constant [pulses/m³]

d = width of the bluff body [m]

St = Strouhal Number

A = cross-section area [m²]

V = flow velocity [m/s]

Requirements

In order to generate the vortex streets, the medium must have a minimum velocity:

- For steam and gases, the flow velocity must be 2 to 80 m/s (6.6 to 262 ft/s)
- For liquids the flow velocity must be 0.4 to 10 m/s (1.3 to 32.8 ft/s)

Design

SITRANS FX300 vortex flowmeters are available in the following variants:

SITRANS FX300 Single transmitter

The single transmitter variant is available in flange or sandwich design and following configurations:

- **Basic version**
Suitable for liquids and gases, integrated temperature compensation included as standard for saturated steam
- **With integrated pressure compensation**
Version with integrated temperature and pressure compensation for gases, wet gases, gas mixtures or steam (energy measurement optional)
- **With integrated pressure compensation and isolation valve**
Allowing the pressure sensor to be shut off for the purpose of pressure and leak testing of the pipeline or for being exchanged without interrupting the process.
- **Remote version**
With this version transmitter and sensor are locally separated. In addition, it offers the same the features as the compact version (integrated temperature and pressure compensation, isolation valve).

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and transmitters providing twofold functional reliability and availability of the measurement. This variant is optimally suited for measurements in multi-product pipelines.

The dual converter is available as:

- **Basic version**
Suitable for liquids and gases, temperature compensation integrated as standard for saturated steam

Technical specifications

Input	
Measuring range limits	See „Dimensional Drawings“
Media pressure	1 ... 100 bar (14.5 ... 1450 psi) (Higher pressures on request)
Output	
Current output	
• Measuring range	4 ... 20 mA
• Over range	20.8 mA ± 1 % (105 % ± 1 %)
• Load	
- min.	100 Ω
- max.	$R_{\max} = (U_{\text{Power Supply}} - 14 \text{ V}) / 22 \text{ mA}$
• Error signal	NAMUR NE 43
• Maximum output	22 mA (112.5 %)
• Multidrop mode	4 mA
Digital output	
• Communication	HART
• Physical layer	FSK
• Device category	Transmitter
Pulse output	
Passive pulse output, setting pulse value (meter factor) for totalized flow or heat quantity (energy) with option Y47 (e.g.: 1 pulse/kg or 1 pulse/kWh)	
• Pulse frequency	Max. 0.5 Hz
• Power supply	Min. 24 V DC as NAMUR or
• Non-Ex version	open < 1 mA, max. 36 V, closed 100 mA, $U < 2 \text{ V}$
• Ex version	open < 1 mA, max. 30 V, closed 100 mA, $U < 2 \text{ V}$
Accuracy	
Standard version	
• For liquids	
- $Re \geq 20\,000$	± 0.75 %
• For steam and gases	
- $Re \geq 20\,000$	± 1 %
• For steam, gases and liquids	
- $10\,000 < Re < 20\,000$	± 2 %
Pressure and temperature-compensated version	
• For liquids	
- $10\,000 < Re < 20\,000$	± 2 %
- $Re \geq 20\,000$	± 0.75 %
• For gases and steam	
- $10\,000 < Re < 20\,000$	± 2.5 %
- $Re \geq 20\,000$	± 1.5 %
Repeatability	± 0.1 %
Installation conditions	
(At different conditions, e.g. installation after control valve, bends or reductions, please refer to the operating instructions.)	
• Inlet run	≥ 20 x DN
• Outlet run	≥ 5 x DN

Software		Design	
Uncompensated for liquids and gases, density-compensated by temperature for saturated steam	Order option 1	Material	
Density-compensated by temperature and pressure for superheated steam	Order option 4	• Sensor/Pick-up	AISI 316L (1.4404)/ AISI 316L (1.4435)
Gross heat meter			Hastelloy C22/2.4602 available on request (contact your local Siemens representative)
When the thermal energy of steam is to be measured	Order option 5	• Transmitter housing	Aluminum
Following information is required at option Y51 to Y56	<ul style="list-style-type: none"> • Y51 Variable current output: Flow rate, power • Y52 Power unit Select one of the following units: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom) • Y53 Fullscale value power • Y54 Variable pulse output: Totalized flow, energy • Y55 Totalizer on/off • Y56 Energy unit Select one of the following units: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom). 	• Sensor gaskets (Pick-up/Pressure sensor)	AISI 316L (1.4435) / FPM or FFKM
Density compensated by temperature and pressure for gases, wet gases	Order option 7	Process connections	FPM (Viton) for steam and non-aggressive gases. FFKM (Kalrez) for chlorine and other aggressive gases. (The meter is fitted with FPM/FFKM gasket only when configured with pressure sensor)
Wet gases	Select Y49 and enter relative humidity of process medium in %		Flange norm EN 1092-1 form B1/B2 or ANSI B16.5 RF. Other flanges on request (contact your local Siemens representative)
FAD - Free Air Delivery		• Flange version	DN 15 ... 300 (½ ... 12")
When the delivered air of a compressor is to be measured	Order option 8	• Sandwich version	DN 15 ... 100 (½ ... 4")
In Y81 to Y87 add information regarding:	<ul style="list-style-type: none"> • Y81 Inlet suction temperature • Y82 Atmospheric pressure • Y83 Pressure drop at inlet suction filter • Y84 Inlet relative humidity • Y85 Actual compressor rotation (rpm) • Y86 Rated compressor rotation (rpm) • Y87 Relative humidity at compressor output 	Degree of protection	IP66/IP67
Mixed gases	When fluid is a gas mixture, specify the single gas components and their amount/concentration in %.	Dimensions and weights	See "Dimensional Drawings"
Rated operation conditions		Display and operating interface	
Ambient temperature		Local display	2 lines, 10 characters per line
• Non-Ex version	-40 ... +85 °C (-40 ... +185 °F)	Languages	German, English, French
• Ex version	-40 ... +65 °C (-40 ... +149 °F)	Power supply	
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)	• Standard version	14 ... 36 V DC
Media temperature	-40 ... +240 °C (-40 ... +464 °F)	• Ex version	14 ... 30 V DC
Density	Taken into consideration when dimensioning	Certificates and approvals	
Viscosity	<10 cP	Explosion protection	
Reynolds number	10 000 ... 2 300 000	• ATEX	II 2G EEx d ia [ia] IIC T6
Media pressure limit	Max. 100 bar (1450 psi) Higher pressure on request (contact your local Siemens representative)	• FM US/C	Class I, II, III, Div. 1 and 2
		Calibration	
		All flowmeters will be delivered with a 3 point calibration certificate	
		Material Certificate	
		Certificate of compliance, pressure test, material certificate, material in acc. of NACE and PMI of pressure bearing metal parts.	
		Cleaning	
		Choose Cleaning Class1 when fluid is oxygen or contains chloride.	
		Certificates	
		X-ray and dye penetration test on pressure bearing weldings	

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7ME2600-	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Connection size	Sensor size		
DN 15 (½")	DN 15	1 A	
DN 25 (1")	DN 25	2 B	
DN 40 (1½")	DN 40	2 K	
DN 50 (2")	DN 50	2 R	
DN 80 (3")	DN 80	3 L	
DN 100 (4")	DN 100	3 S	
DN 150 (6")	DN 150	4 M	
DN 200 (8")	DN 200	4 T	
DN 250 (10")	DN 250	4 W	
DN 300 (12")	DN 300	5 E	
Flange norm and nominal pressure			
Form B1/B2	EN 1092-1		
PN 10	DN 200 ... 300	A	
PN 16	DN 50 ... 300	B	
PN 25	DN 200 ... 300	C	
PN 40	DN 15 ... 300	D	
PN 63	DN 50 ... 150	E	
PN 100	DN 15 ... 150	F	
RF	ANSI B16.5		
class 150	½ ... 12"	J	
class 300	½ ... 12"	K	
class 600	½ ... 6"	L	
Sensor material/Gasket			
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM		1	
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM		5	
Transmitter design			
Compact version - no cable		1	
Remote version:			
5 m (16.4 ft)		2	
10 m (32.8 ft)		3	
15 m (49.2 ft)		4	
Approval and cable gland			
Non-Ex, M20 x 1.5		1	
Non-Ex, ½" NPT		2	
FM approval Class 1 Div. 2, M20 x 1.5		3	
ATEX, M20 x 1.5		4	
ATEX, ½" NPT		5	
FM approval Class 1 Div. 1, M20 x 1.5		6	
FM approval Class 1 Div. 1, 1/2" NPT		7	
FM approval Class 1 Div. 2, 1/2" NPT		8	
Further approvals and cable glands			
IEC Ex with M20 x 1.5		9	N 0 A
IEC Ex with ½" NPT		9	N 0 B
Transmitter, display and communication			
With display, HART		A	

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7ME2600-	
Pressure sensor and isolation valve			
Without pressure sensor			A
With pressure sensor, range:			B
4 bar (58 psi)			D
6 bar (87 psi)			E
10 bar (145 psi)			G
16 bar (232 psi)			H
25 bar (363 psi)			K
40 bar (580 psi)			L
60 bar (870 psi)			N
100 bar (1450 psi)			
With isolation valve and pressure sensor, range:			P
4 bar (58 psi)			Q
6 bar (87 psi)			R
10 bar (145 psi)			S
16 bar (232 psi)			U
25 bar (363 psi)			V
40 bar (580 psi)			W
60 bar (870 psi)			Y
100 bar (1450 psi)			
Software			
Uncompensated for liquids and gases, density compensated by temperature for saturated steam			1
Density compensation for superheated steam			4
Density compensated by temperature and pressure for superheated steam, gross heat meter - setting of energy metering at option Y51 ... Y56			5
Density compensation for gases, wet gases and mixed gases - setting of relative humidity at option Y49			7
Density compensation for gases, wet gases and mixed gases, Free air delivery (FAD) - setting of FAD at option Y81 ... Y87 and relative humidity at option Y49			8

Selection and Ordering data

Order code

Additional information

Please add "-Z" to Article No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.

Input process data

Medium: Specify medium (Liquid, gas, steam or customer-specific)	Y40
Temperature: Specify operating temperature with unit	Y41
Pressure: Specify operating pressure with unit	Y42
Density (only for customer-specified medium): Specify density with unit	Y43
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44
Flow rate: Specify max. flow rate with units	Y45
Setting of pulse output: Specify pulse value (meter factor) for totalized flow or energy (1 pulse/unit)	Y47
Relative humidity of process medium in %	Y49

Settings of gross heat

Variable current output: Flow rate, power	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom))	Y52
Fullscale value power	Y53
Variable pulse output: Totalized flow, energy	Y54
Totalizer on/off	Y55
Energy unit (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom))	Y56

Settings of FAD

Inlet suction temperature ¹⁾	Y81
Atmospheric pressure ¹⁾	Y82
Pressure drop at inlet suction filter ²⁾	Y83
Inlet relative humidity ¹⁾	Y84
Actual compressor rotation (rpm) ²⁾	Y85
Rated compressor rotation (rpm) ²⁾	Y86
Relative humidity at compressor outlet ²⁾	Y87

¹⁾ Required information from customer.²⁾ Required information from compressor manufacturer (data sheet).**Operating instructions**

Description	Article No.
English	A5E2100423
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.	
All literature is also available for free at: http://www.siemens.com/flowdocumentation	

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code.

Converter housing material

Aluminum for increased requirement, color: petrol green	A10
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Material certificate

Certificate of compliance EN 10204-2.1	C10
Pressure test + 3.1 accordance EN 10204	C11
Material certificate of pressure bearing parts + certificate 3.1	C12
Material in accordance with NACE MR 0175-01	C13
PMI of pressure bearing metal parts + certificate 3.1	C14
Material certificate of pressure bearing parts + PMI + certificate 3.1	C15

Calibration certificate FX300

As standard the flow device has a 3-point calibration certificate.

5-point calibration certificate	D11
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Hardness test

Hardness test on pressure bearing parts + certificate 3.1	H30
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Cleaning

Cleaning class 1	K46
Cleaning class 1 + certificate 3.1 acc. EN 10204	K48

Certificates

X-ray test on pressure bearing weldings	M56
Dye penetration test on pressure bearing weldings	M58

Tag name plate

Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	Y17
Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	Y18

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7ME2700	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Connection size	Sensor size		
DN 15 (½")	DN 15	1 A	
DN 25 (1")	DN 25	2 B	
DN 40 (1½")	DN 40	2 K	
DN 50 (2")	DN 50	2 R	
DN 80 (3")	DN 80	3 L	
DN 100 (4")	DN 100	3 S	
Nominal pressure			
EN			
PN 16	DN 50 ... 100	B	
PN 40	DN 15 ... 100	D	
PN 63	DN 50 ... 100	E	
PN 100	DN 15 ... 100	F	
ANSI			
150 lb	½ ... 4"	J	
300 lb	½ ... 4"	K	
600 lb	½ ... 4"	L	
Sensor material/Gasket			
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM		1	
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM		5	
Transmitter design			
Compact version - no cable		1	
Remote version:			
5 m (16.4 ft)		2	
10 m (32.8 ft)		3	
15 m (49.2 ft)		4	
Approval and cable gland			
Non-Ex, M20 x 1.5		1	
Non-Ex, ½" NPT		2	
FM approval Class 1 Div. 2, M20 x 1.5		3	
ATEX, M20 x 1.5		4	
ATEX, ½" NPT		5	
FM approval Class 1 Div. 1, M20 x 1.5		6	
FM approval Class 1 Div. 1, 1/2" NPT		7	
FM approval Class 1 Div. 2, 1/2" NPT		8	
Further approvals and cable glands			
IEC Ex with M20 x 1.5		9	N 0 A
IEC Ex with ½" NPT		9	N 0 B
Transmitter, display and communication			
With display, HART		A	

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7ME2700	
Pressure sensor and isolation valve			
Without pressure sensor			A
With pressure sensor, range:			
4 bar (58 psi)			B
6 bar (87 psi)			D
10 bar (145 psi)			E
16 bar (232 psi)			G
25 bar (363 psi)			H
40 bar (580 psi)			K
60 bar (870 psi)			L
100 bar (1450 psi)			N
With isolation valve and pressure sensor, range:			
4 bar (58 psi)			P
6 bar (87 psi)			Q
10 bar (145 psi)			R
16 bar (232 psi)			S
25 bar (363 psi)			U
40 bar (580 psi)			V
60 bar (870 psi)			W
100 bar (1450 psi)			Y
Software			
Uncompensated for liquids and gases, density compensated by temperature for saturated steam			1
Density compensation for superheated steam			4
Density compensated by temperature and pressure for superheated steam, gross heat meter - setting of energy metering at option Y51 ... Y56			5
Density compensation for gases, wet gases and mixed gases - setting of relative humidity at option Y49			7
Density compensation for gases, wet gases and mixed gases, Free air delivery (FAD) - setting of FAD at option Y81 ... Y87 and relative humidity at option Y49			8

Selection and Ordering data

Order code

Additional information

Please add "-Z" to Article No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.

Input process data

Medium: Specify medium (Liquid, gas, steam or customer-specific)	Y40
Temperature: Specify operating temperature with unit	Y41
Pressure: Specify operating pressure with unit	Y42
Density (only for customer-specified medium): Specify density with unit	Y43
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44
Flow rate: Specify max. flow rate with units	Y45
Setting of pulse output: Specify pulse value (meter factor) for totalized flow or energy (1 pulse/unit)	Y47
Relative humidity of process medium in %	Y49

Settings of gross heat

Variable current output: Flow rate, power	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom))	Y52
Fullscale value power	Y53
Variable pulse output: Totalized flow, energy	Y54
Totalizer on/off	Y55
Energy unit (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom))	Y56

Settings of FAD

Inlet suction temperature ¹⁾	Y81
Atmospheric pressure ¹⁾	Y82
Pressure drop at inlet suction filter ²⁾	Y83
Inlet relative humidity ¹⁾	Y84
Actual compressor rotation (rpm) ²⁾	Y85
Rated compressor rotation (rpm) ²⁾	Y86
Relative humidity at compressor outlet ²⁾	Y87

¹⁾ Required information from customer.²⁾ Required information from compressor manufacturer (data sheet).**Operating instructions**

Description	Article No.
English	A5E2100423
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.	
All literature is also available for free at: http://www.siemens.com/flowdocumentation	

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code.

Converter housing materialAluminum for increased requirement, color: petrol green **A10****Material certificate**

Certificate of compliance EN 10204-2.1	C10
Pressure test + 3.1 accordance EN 10204	C11
Material certificate of pressure bearing parts + certificate 3.1	C12
Material in accordance with NACE MR 0175-01	C13
PMI of pressure bearing metal parts + certificate 3.1	C14
Material certificate of pressure bearing parts + PMI + certificate 3.1	C15

Calibration certificate FX300

As standard the flow device has a 3-point calibration certificate.

5-point calibration certificate **D11****Hardness test**Hardness test on pressure bearing parts + certificate 3.1 **H30****Cleaning**

Cleaning class 1	K46
Cleaning class 1 + certificate 3.1 acc. EN 10204	K48

Certificates

X-ray test on pressure bearing weldings	M56
Dye penetration test on pressure bearing weldings	M58

Tag name plate

Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	Y17
Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	Y18

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Flanged Dual transmitter and T_{max} = 240 °C (464 °F)		7ME2800-	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Connection size	Sensor size		
DN 40 (1½")	DN 40	2 K	
DN 50 (2")	DN 50	2 R	
DN 80 (3")	DN 80	3 L	
DN 100 (4")	DN 100	3 S	
DN 150 (6")	DN 150	4 M	
DN 200 (8")	DN 200	4 T	
DN 250 (10")	DN 250	4 W	
DN 300 (12")	DN 300	5 E	
Flange norm and nominal pressure			
Form B1/B2	EN 1092-1		
PN 10	DN 200 ... 300	A	
PN 16	DN 50 ... 300	B	
PN 25	DN 200 ... 300	C	
PN 40	DN 40 ... 300	D	
PN 63	DN 50 ... 150	E	
PN 100	DN 40 ... 150	F	
RF	ANSI B16.5		
150 lb	1½ ... 12"	J	
300 lb	1½ ... 12"	K	
600 lb	1½ ... 6"	L	
Sensor material/Gasket			
Stainless steel AISI 316L (1.4404)/ AISI 316L (1.4435)/FPM		1	
Stainless steel AISI 316L (1.4404)/ AISI 316L (1.4435)/FFKM		5	
Transmitter design			
Compact version - no cable		1	
Remote version:			
5 m (16.4 ft)		2	
10 m (32.8 ft)		3	
15 m (49.2 ft)		4	
Approval and cable gland			
Non-Ex, M20 x 1.5		1	
Non-Ex, ½" NPT		2	
FM approval Class 1 Div. 2, M20 x 1.5		3	
ATEX, M20 x 1.5		4	
ATEX, ½" NPT		5	
FM approval Class 1 Div. 1, M20 x 1.5		6	
FM approval Class 1 Div. 1, 1/2" NPT		7	
FM approval Class 1 Div. 2, 1/2" NPT		8	
Further approvals and cable glands			
IEC Ex with M20 x 1.5		9	N 0 A
IEC Ex with ½" NPT		9	N 0 B
Transmitter, display and communication			
With display, HART			A
Pressure sensor and isolation valve			
Without pressure sensor			A
Software			
Uncompensated for liquids and gases, density-compensated by temperature for saturated steam			1

Selection and Ordering data	Order code
Additional information Please add "-Z" to Article No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.	
Input process data	
Specify medium (Liquid, gas, steam or customer-specific)	Y40
Temperature: Specify operating temperature with unit	Y41
Pressure: Specify operating pressure with unit	Y42
Density (only for customer-specified medium): Specify density with unit	Y43
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44
Flow rate: Specify max. flow rate with units	Y45
Setting of pulse output: Specify pulse value (meter factor) for totalized flow (1 pulse/unit)	Y47
Relative humidity of process medium in %	Y49

Operating instructions for SITRANS FX300



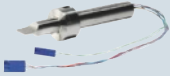

Description	Article No.
English	A5E2100423

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code.	
Converter housing material	
Aluminum for increased requirement, color: petrol green	A10
Material certificate	
Certificate of compliance EN 10204-2.1	C10
Pressure test + 3.1 accordance EN 10204	C11
Material certificate of pressure bearing parts + certificate 3.1	C12
Material in accordance with NACE MR 0175-01	C13
PMI of pressure bearing metal parts + certificate 3.1	C14
Material certificate of pressure bearing parts + PMI + certificate 3.1	C15
Calibration certificate FX300	
As standard the flow device has a 3-point calibration certificate.	
5-point calibration certificate	D11
Hardness test	
Hardness test on pressure bearing parts + certificate 3.1	H30
Cleaning	
Cleaning class 1	K46
Cleaning class 1 + certificate 3.1 acc. EN 10204	K48
Certificates	
X-ray test on pressure bearing weldings	M56
Dye penetration test on pressure bearing weldings	M58
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	Y17
Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	Y18

SITRANS FX300 spare parts

Description	Article No.	
Seal disc 21.8-12-0.1	A5E02181439	
O-ring pickup	A5E02181464	
O-ring for pressure screw 17.13 x 2.62-FPM-70	A5E02181488	
Cover gasket O-Ring 91.67 x 3.5	A5E02181492	
Converter housing gasket 59.35.5-2-N	A5E02181495	
O-ring DIN3771-20 x 1-FPM for sensor	A5E02181515	
O-ring 10 x 2-NBR for lead- through	A5E02181525	
DUBOX plug, 5-pole-RM2	A5E02181527	
Electronic <ul style="list-style-type: none"> • Basic D-HART • Steam D-HART • Gas D-HART 	A5E02181531 A5E02181541 A5E02181544	
Display	A5E02181558	
Cable feedthrough 10-pole (non-Ex). O-ring for cable feedthrough 21.89 x 2.62 10-pole plug	A5E02181562	
Sensor replacement (incl. Seal disc, pickup, O-rings for pickup, and pressure screw <ul style="list-style-type: none"> • DN 15 (incl. 1/2" socket) • DN 25 (incl. 1" socket) • DN 40 ... 100 • DN 150 ... 300 	A5E02181087 A5E02181116 A5E02181152 A5E02275105	
Pressure sensor replacement (Incl. pressure sensor, DUBOX plug, 2 O-rings and calibration certificate) <ul style="list-style-type: none"> • 4 bar (58 psi) • 6 bar (87 psi) • 10 bar (145 psi) • 16 bar (232 psi) • 25 bar (363 psi) • 40 bar (580 psi) • 60 bar (870 psi) • 100 bar (1450 psi) 	A5E02181157 A5E02181175 A5E02181180 A5E02181221 A5E02181307 A5E02181316 A5E02181322 A5E02181437	

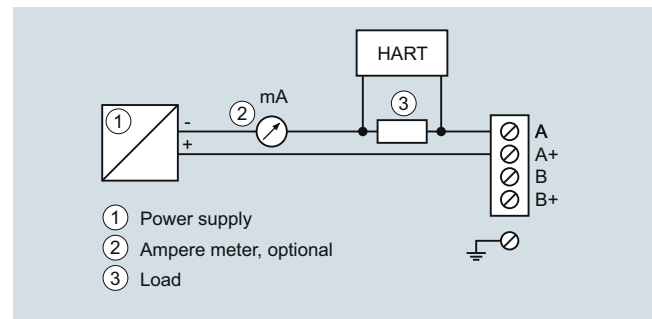
Description

Service Toolbox for program-
ming software (basic, steam
and gas); for changing set-
tings and diagnostics
Note: Dedicated service train-
ing is required. Please contact
Customer Support.

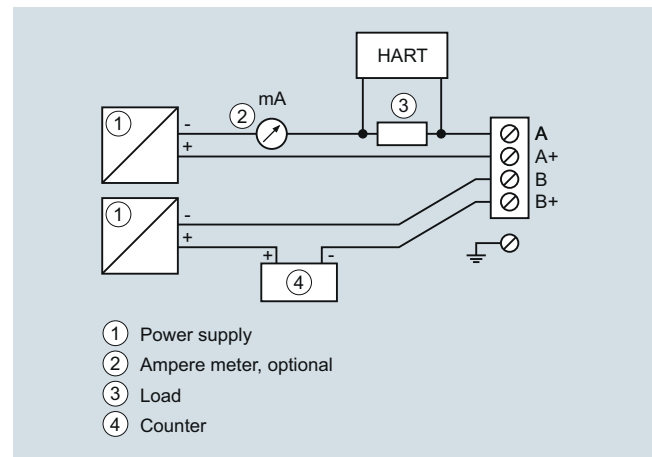
Article No.

A5E02375819

Schematics



Connection power supply and HART communication



Connection pulse output

Flow Measurement

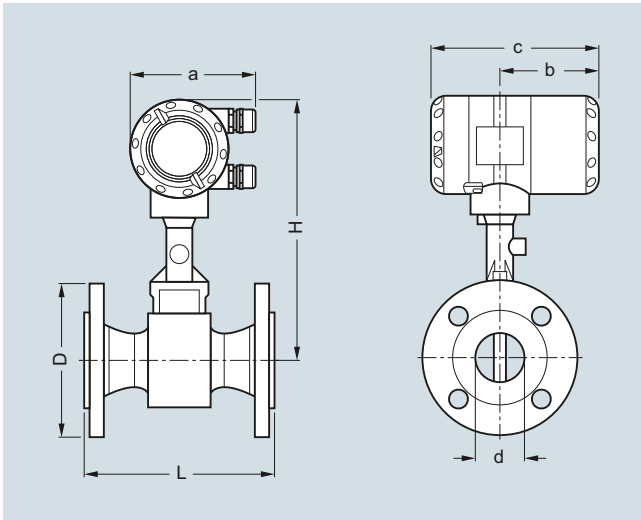
SITRANS F X

SITRANS FX300

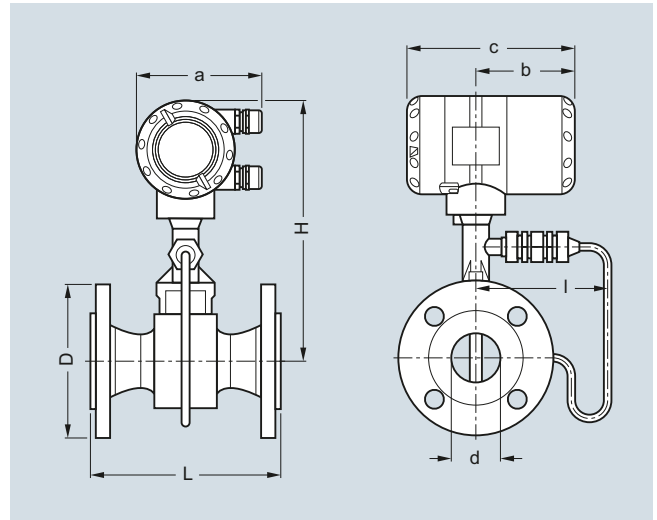
Dimensional drawings

Compact version

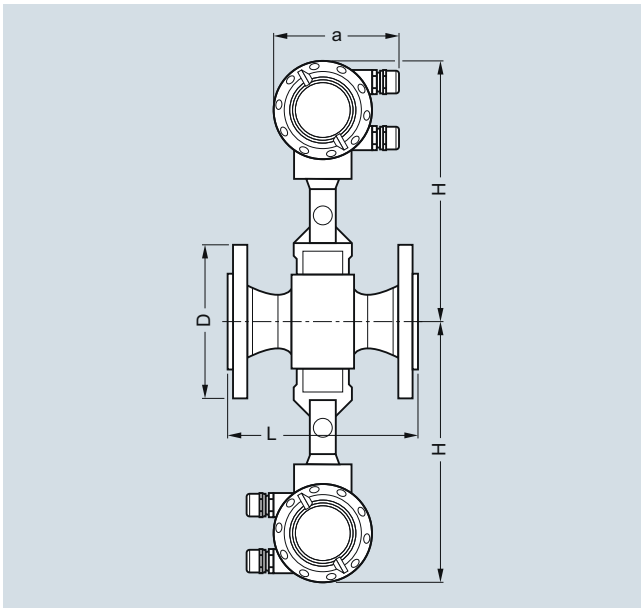
3



Flange version



Flange version with pressure sensor



Flange version, dual converter

Flange version EN1092-1

Size DN	Pres- sure rating PN	Dimensions [mm (inch)]								Weight [kg (lb)] ¹⁾	
		a	b	c	d	D	L	H	I	Flowmeter (without pres- sure sensor)	Flowmeter (with pres- sure sensor)
15	40	133 (5.24)	105 (4.13)	179 (7.05)	17.3 (0.68)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.5 (12.13)	6.1 (13.45)
15	100	133 (5.24)	105 (4.13)	179 (7.05)	17.3 (0.68)	105 (4.13)	200 (7.87)	265 (10.43)	144 (5.67)	6.5 (14.33)	7.1 (15.65)
25	40	133 (5.24)	105 (4.13)	179 (7.05)	28.5 (1.12)	115 (4.53)	200 (7.87)	265 (10.43)	144 (5.67)	7.3 (16.09)	7.9 (17.42)
25	100	133 (5.24)	105 (4.13)	179 (7.05)	28.5 (1.12)	140 (5.51)	200 (7.87)	265 (10.43)	144 (5.67)	9.3 (20.50)	9.9 (21.83)
40	40	133 (5.24)	105 (4.13)	179 (7.05)	43.1 (1.70)	150 (5.91)	200 (7.87)	270 (10.63)	144 (5.67)	10.2 (22.49)	10.8 (23.81)
40	100	133 (5.24)	105 (4.13)	179 (7.05)	42.5 (1.67)	170 (6.69)	200 (7.87)	270 (10.63)	144 (5.67)	14.2 (31.31)	14.8 (32.63)
50	16	133 (5.24)	105 (4.13)	179 (7.05)	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.1 (26.68)	12.7 (28.00)
50	40	133 (5.24)	105 (4.13)	179 (7.05)	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.3 (27.12)	12.9 (28.44)
50	63	133 (5.24)	105 (4.13)	179 (7.05)	54.5 (2.15)	180 (7.09)	200 (7.87)	275 (10.83)	144 (5.67)	16.3 (35.94)	16.9 (37.26)
50	100	133 (5.24)	105 (4.13)	179 (7.05)	53.9 (2.12)	195 (7.68)	200 (7.87)	275 (10.83)	144 (5.67)	17.8 (39.24)	18.4 (40.57)
80	16	133 (5.24)	105 (4.13)	179 (7.05)	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	16.8 (37.04)	17.4 (38.36)
80	40	133 (5.24)	105 (4.13)	179 (7.05)	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	18.8 (41.45)	19.4 (42.77)
80	63	133 (5.24)	105 (4.13)	179 (7.05)	81.7 (3.22)	215 (8.46)	200 (7.87)	290 (11.42)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
80	100	133 (5.24)	105 (4.13)	179 (7.05)	80.9 (3.19)	230 (9.06)	200 (7.87)	290 (11.42)	154 (6.06)	26.8 (59.08)	27.4 (60.41)
100	16	133 (5.24)	105 (4.13)	179 (7.05)	107.1 (4.22)	220 (8.66)	250 (9.84)	310 (12.20)	164 (6.46)	21.4 (47.18)	22 (48.50)
100	40	133 (5.24)	105 (4.13)	179 (7.05)	107.1 (4.22)	235 (9.25)	250 (9.84)	310 (12.20)	164 (6.46)	24.4 (53.79)	25 (55.12)
100	63	133 (5.24)	105 (4.13)	179 (7.05)	106.3 (4.19)	250 (9.84)	250 (9.84)	310 (12.20)	164 (6.46)	29.4 (64.82)	30 (66.14)
100	100	133 (5.24)	105 (4.13)	179 (7.05)	104.3 (4.11)	265 (10.43)	250 (9.84)	310 (12.20)	164 (6.46)	35.4 (78.04)	36 (79.37)
150	16	133 (5.24)	105 (4.13)	179 (7.05)	159.3 (6.27)	285 (11.22)	300 (11.81)	325 (12.80)	174 (6.85)	35.2 (77.60)	35.8 (78.93)
150	40	133 (5.24)	105 (4.13)	179 (7.05)	159.3 (6.27)	300 (11.81)	300 (11.81)	325 (12.80)	174 (6.85)	41.2 (90.83)	41.8 (92.15)
150	63	133 (5.24)	105 (4.13)	179 (7.05)	157.1 (6.19)	345 (13.58)	300 (11.81)	325 (12.80)	174 (6.85)	59.2 (130.51)	59.8 (131.84)
150	100	133 (5.24)	105 (4.13)	179 (7.05)	154.1 (6.07)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	67.2 (148.15)	67.8 (149.47)
200	10	133 (5.24)	105 (4.13)	179 (7.05)	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	16	133 (5.24)	105 (4.13)	179 (7.05)	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	25	133 (5.24)	105 (4.13)	179 (7.05)	206.5 (8.13)	360 (14.17)	300 (11.81)	350 (13.78)	194 (7.64)	46.8 (103.18)	47.4 (104.50)
200	40	133 (5.24)	105 (4.13)	179 (7.05)	206.5 (8.13)	375 (14.76)	300 (11.81)	350 (13.78)	194 (7.64)	54.8 (120.81)	55.4 (122.14)
250	10	133 (5.24)	105 (4.13)	179 (7.05)	260.4 (10.25)	395 (15.55)	380 (14.96)	370 (14.57)	224 (8.82)	57.4 (126.55)	58.0 (127.87)
250	16	133 (5.24)	105 (4.13)	179 (7.05)	260.4 (10.25)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	58.4 (128.75)	59.0 (130.07)
250	25	133 (5.24)	105 (4.13)	179 (7.05)	258.8 (10.19)	425 (16.73)	380 (14.96)	370 (14.57)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
250	40	133 (5.24)	105 (4.13)	179 (7.05)	258.8 (10.19)	450 (17.72)	380 (14.96)	370 (14.57)	224 (8.82)	92.4 (203.71)	93.0 (205.03)
300	10	133 (5.24)	105 (4.13)	179 (7.05)	309.7 (12.19)	445 (17.52)	450 (17.72)	395 (15.55)	244 (9.61)	75.7 (166.89)	76.3 (168.21)
300	16	133 (5.24)	105 (4.13)	179 (7.05)	309.7 (12.19)	460 (18.11)	450 (17.72)	395 (15.55)	244 (9.61)	82.2 (181.22)	82.8 (182.54)
300	25	133 (5.24)	105 (4.13)	179 (7.05)	307.9 (12.12)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	98.7 (217.60)	99.3 (218.92)
300	40	133 (5.24)	105 (4.13)	179 (7.05)	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	127.5 (281.09)	128.1 (282.41)

1) For dual converter: specified weight + 2.80 kg (6.17 lb).

Flow Measurement

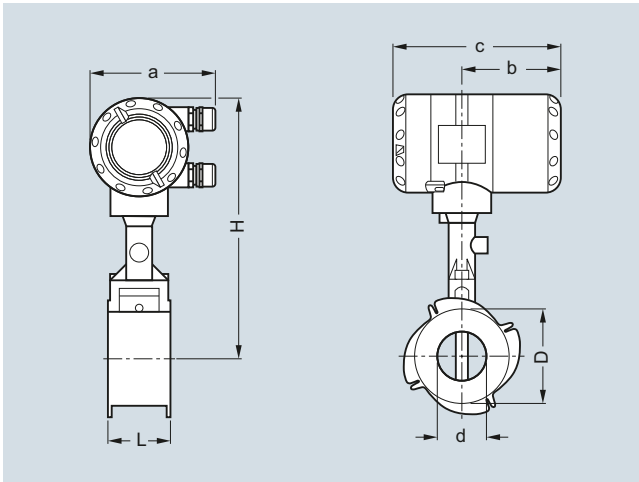
SITRANS F X

SITRANS FX300

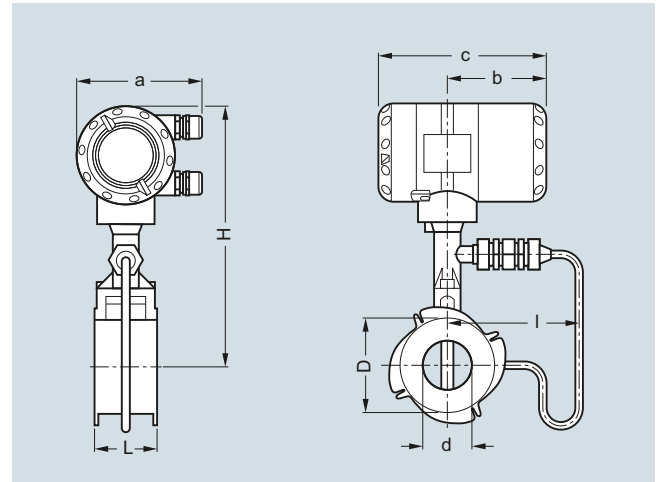
Flange version ANSI B16.5

Size DN	Pres- sure rating Class	Dimensions [mm (inch)]								Weight [kg (lb)] ¹⁾	
		a	b	c	d	D	L	H	I	Flowmeter (without pressure sen- sor)	Flowmeter (with pres- sure sensor)
½	150	133 (5.24)	105 (4.13)	179 (7.05)	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	4.5 (9.92)	5.1 (11.24)
½	300	133 (5.24)	105 (4.13)	179 (7.05)	15.8 (0.62)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	4.9 (10.80)	5.5 (12.13)
½	600	133 (5.24)	105 (4.13)	179 (7.05)	13.9 (0.55)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.1 (11.24)	5.7 (12.57)
1	150	133 (5.24)	105 (4.13)	179 (7.05)	26.6 (1.05)	110 (4.33)	200 (7.87)	265 (10.43)	144 (5.67)	6.2 (13.67)	6.8 (14.99)
1	300	133 (5.24)	105 (4.13)	179 (7.05)	26.6 (1.05)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.2 (15.87)	7.8 (17.20)
1	600	133 (5.24)	105 (4.13)	179 (7.05)	24.3 (0.96)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.5 (16.53)	8.1 (17.86)
1½	150	133 (5.24)	105 (4.13)	179 (7.05)	40.9 (1.61)	125 (4.92)	200 (7.87)	270 (10.63)	144 (5.67)	8.3 (18.30)	8.9 (19.62)
1½	300	133 (5.24)	105 (4.13)	179 (7.05)	40.9 (1.61)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	10.4 (22.93)	11 (24.25)
1½	600	133 (5.24)	105 (4.13)	179 (7.05)	38.1 (1.50)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	11.4 (25.13)	12 (26.46)
2	150	133 (5.24)	105 (4.13)	179 (7.05)	52.6 (2.07)	150 (5.91)	200 (7.87)	275 (10.83)	144 (5.67)	11 (24.25)	11.6 (25.57)
2	300	133 (5.24)	105 (4.13)	179 (7.05)	52.6 (2.07)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.4 (27.34)	13 (28.66)
2	600	133 (5.24)	105 (4.13)	179 (7.05)	49.3 (1.94)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	13.9 (30.64)	14.5 (31.97)
3	150	133 (5.24)	105 (4.13)	179 (7.05)	78 (3.07)	190 (7.48)	200 (7.87)	290 (11.42)	154 (6.06)	19.8 (43.65)	20.4 (44.97)
3	300	133 (5.24)	105 (4.13)	179 (7.05)	78 (3.07)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
3	600	133 (5.24)	105 (4.13)	179 (7.05)	73.7 (2.90)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	23.8 (52.47)	24.4 (53.79)
4	150	133 (5.24)	105 (4.13)	179 (7.05)	102.4 (4.03)	230 (9.06)	250 (9.84)	310 (12.20)	164 (6.46)	23.4 (51.59)	24 (52.91)
4	300	133 (5.24)	105 (4.13)	179 (7.05)	102.4 (4.03)	255 (10.04)	250 (9.84)	310 (12.20)	164 (6.46)	31.4 (69.23)	32 (70.55)
4	600	133 (5.24)	105 (4.13)	179 (7.05)	97.2 (3.83)	275 (10.83)	250 (9.84)	310 (12.20)	164 (6.46)	40.4 (89.07)	41 (90.39)
6	150	133 (5.24)	105 (4.13)	179 (7.05)	154.2 (6.07)	280 (11.02)	300 (11.81)	325 (12.80)	174 (6.85)	36.2 (79.81)	36.8 (81.13)
6	300	133 (5.24)	105 (4.13)	179 (7.05)	154.2 (6.07)	320 (12.60)	300 (11.81)	325 (12.80)	174 (6.85)	51.2 (112.88)	51.8 (114.20)
6	600	133 (5.24)	105 (4.13)	179 (7.05)	146.3 (5.76)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	46.2 (101.85)	76.8 (169.31)
8	150	133 (5.24)	105 (4.13)	179 (7.05)	202.7 (7.98)	345 (13.58)	300 (11.81)	350 (13.78)	194 (7.64)	50.0 (110.23)	50.6 (111.55)
8	300	133 (5.24)	105 (4.13)	179 (7.05)	202.7 (7.98)	380 (14.96)	300 (11.81)	350 (13.78)	194 (7.64)	74.8 (164.91)	75.4 (166.23)
10	150	133 (5.24)	105 (4.13)	179 (7.05)	254.5 (10.02)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
10	300	133 (5.24)	105 (4.13)	179 (7.05)	254.5 (10.02)	455 (17.91)	380 (14.96)	370 (14.57)	224 (8.82)	106.4 (234.57)	107.0 (235.89)
12	150	133 (5.24)	105 (4.13)	179 (7.05)	304.8 (12.00)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	106.3 (234.35)	106.9 (235.67)
12	300	133 (5.24)	105 (4.13)	179 (7.05)	304.8 (12.00)	520 (20.47)	450 (17.72)	395 (15.55)	244 (9.61)	151.3 (333.56)	151.9 (334.88)

¹⁾ For dual converter: specified weight + 2.80 kg (6.17 lb).



Sandwich version



Sandwich version with pressure sensor

Sandwich version EN

Size DN	Pressure rating PN	Dimensions [mm (inch)]								Weight [kg (lb)]	
		a	b	c	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
15	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	3.5 (7.72)	4.1 (9.04)
25	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.3 (9.48)	4.9 (10.80)
40	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	4.9 (10.80)	5.5 (12.13)
50	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6 (13.23)	6.6 (14.55)
80	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.2 (18.08)	8.8 (19.40)
100	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	9.5 (20.94)	10.1 (22.27)

Sandwich version ANSI

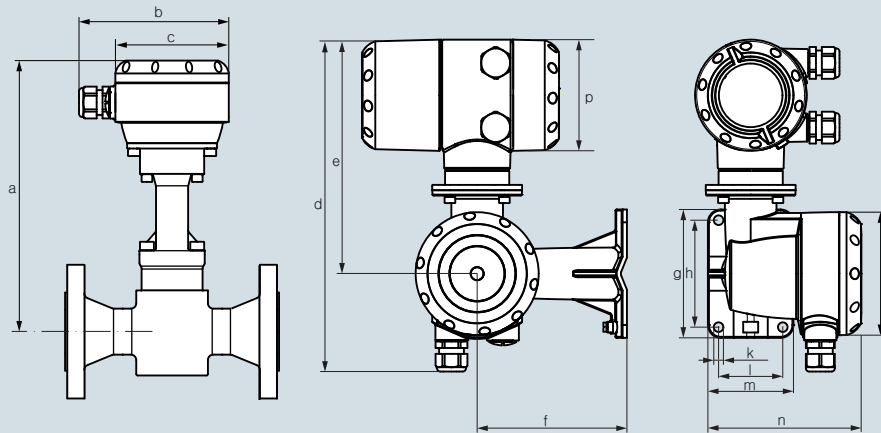
Size DN	Pressure rating Class	Dimensions [inch]								Weight [lb]	
		a	b	c	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
½"	150, 300, 600	5.24	4.13	7.05	0.63	1.77	2.56	10.43	5.67	7.72	9.04
1"	150, 300, 600	5.24	4.13	7.05	0.94	2.56	2.56	10.43	5.67	9.48	10.80
1½"	150, 300, 600	5.24	4.13	7.05	1.50	3.23	2.56	10.63	5.67	10.80	12.13
2"	150, 300, 600	5.24	4.13	7.05	1.97	4.02	2.56	10.83	5.67	13.23	14.55
3"	150, 300, 600	5.24	4.13	7.05	2.91	5.31	2.56	11.42	6.10	18.08	19.40
4"	150, 300, 600	5.24	4.13	7.05	3.82	6.22	2.56	12.20	6.46	20.94	22.27

Flow Measurement

SITRANS F X

SITRANS FX300

Remote version



Flanged version

DN	15	25	40	50	80	100	150	200	250	300			
	½"	1"	1½"	2"	3"	4"	6"	8"	10"	12"			
	a												
[mm]	248	248	253	258	273	293	308	333	353	378			
[inch]	9.77	9.77	9.97	10.2	10.8	11.5	12.1	13.1	13.9	14.9			
	b	c	d	e	f	g	h	j	k	l	m	n	p
[mm]	140	Ø106	310	219	140	120	100	Ø115	Ø9 (4x)	60	80	144	104
[inch]	5.52	Ø4.18	12.2	8.63	5.52	4.73	3.94	Ø4.53	Ø0.36 (4x)	2.36	3.15	5.67	4.09

Sandwich version

DN	15	25	40	50	80	100							
	½"	1"	1½"	2"	3"	4"							
	a												
[mm]	248	248	253	258	273	293							
[inch]	9.77	9.77	9.97	10.2	10.8	11.5							
	b	c	d	e	f	g	h	j	k	l	m	n	p
[mm]	140	Ø106	310	219	140	120	100	Ø115	Ø9 (4x)	60	80	144	104
[inch]	5.52	Ø4.18	12.2	8.63	5.52	4.73	3.94	Ø4.53	Ø0.36 (4x)	2.36	3.15	5.67	4.09

Flow tablesMeasuring Range Limits**Water**

Size		Q _{min}	Q _{max}	Q _{min}	Q _{max}
DN to EN 1092-1	DN to ANSI B16.5	EN 1092-1 [m ³ /h]	EN 1092-1 [m ³ /h]	ANSI B16.5 [m ³ /h]	ANSI B16.5 [m ³ /h]
15	½"	0.45	5.07	0.44	4.94
25	1"	0.81	11.40	0.81	11.40
40	1½"	2.04	28.58	2.04	28.58
50	2"	3.53	49.48	3.53	49.48
80	3"	7.74	108.37	7.74	108.37
100	4"	13.30	186.22	13.30	186.21
150	6"	30.13	421.86	30.13	421.86
200	8"	56.60	792.42	56.60	792.42
250	10"	90.48	1 266.8	90.48	1 266.8
300	12"	131.41	1 839.8	131.41	1 839.8

Values based on water at 20 °C (68 °F)

Air

Size		Q _{min}	Q _{max}	Q _{min}	Q _{max}
DN to EN 1092-1	DN to ANSI B16.5	EN 1092-1 [m ³ /h]	EN 1092-1 [m ³ /h]	ANSI B16.5 [m ³ /h]	ANSI B16.5 [m ³ /h]
15	½"	6.80	25.33	6.72	24.70
25	1"	10.20	81.43	10.20	81.43
40	1½"	25.35	326.63	25.35	326.63
50	2"	43.89	565.49	43.89	565.49
80	3"	96.14	1 238.64	96.14	1 238.60
100	4"	165.19	2 128.27	165.19	2 128.27
150	6"	374.23	4 821.60	374.23	4 821.60
200	8"	702.95	9 056.8	702.95	9 056.8
250	10"	1 123.7	14 478.0	1 123.7	14 478.0
300	12"	1 632.1	21 028.0	1 632.1	21 028.0

Values based on air at 20 °C (68 °F) and 1.013 bar_{abs} (14.7 psi_{abs})Flow rate limits

Product	Nominal diameters		Minimum flow rates [m/s]	Maximum flow rates [m/s]
	to EN	to ANSI		
Liquids	DN 15 ... DN 300	DN ½"...DN 12"	$0.5 \times (998/\rho)^{0.5 \ 1)}$	$7 \times (998/\rho)^{0.47 \ 1)}$
Gas, steam/vapor	DN 15 ... DN 300	DN ½"...DN 12"	$6 \times (1.29/\rho)^{0.5 \ 2)}$	$7 \times (998/\rho)^{0.47 \ 3)}$

 ρ = operating density [kg/m³]

1) Minimum flow rate 0.3 m/s (0.984 ft/s), maximum flow rate 7 m/s (23 ft/s)

2) Minimum flow rate 2 m/s (6.6 ft/s)

3) Maximum flow rate 80 m/s (262 ft/s); DN 15: 45 m/s (148 ft/s) and DN 25: 70 m/s (230 ft/s)

Flow Measurement

SITRANS F X

SITRANS FX300

Measuring range saturated steam: 1 to 7 bar

Overpressure [bar]		1		3.5		5.2		7	
Density [kg/m³]		1.13498		2.4258		3.27653		4.16732	
Temperature [°C]		120.6		148.2		160.4		170.6	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ANSI B16.5								
15	½"	5.87	28.75	7.68	61.46	8.93	83.01	10.06	105.57
25	1"	11.82	92.42	17.28	197.53	20.09	266.81	22.66	339.35
40	1½"	29.64	370.71	43.33	792.33	50.63	1 070.2	56.8	1 361.2
50	2"	51.31	641.82	75.02	1 371.8	87.19	1 852.8	98.33	2 356.6
80	3"	112.41	1 405.8	164.33	3 004.7	191	4 058.4	215.39	5 161.8
100	4"	193.14	2 415.5	282.36	5 162.7	328.16	6 973.3	370.09	8 869.2
150	6"	437.56	5 472.4	639.69	11 696	743.45	15 798	838.44	20 093
200	8"	821.9	10 279.0	1 201.6	21 970.0	1 396.5	29 675.0	1 574.9	37 743
250	10"	1 313.9	16 433.0	1 920.9	35 122.0	2 232.5	47 439.0	2 517.7	60 337
300	12"	1 908.3	23 866.0	2 789.8	51 010.0	3 242.4	68 899.0	3 656.6	87 630

Measuring range saturated steam: 10.5 to 20 bar

Overpressure [bar]		10.5		14		17.5		20	
Density [kg/m³]		5.88803		7.60297		9.31702		10.5442	
Temperature [°C]		186.2		198.5		208.7		215	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ANSI B16.5								
15	½"	12.78	149.17	16.51	192.61	20.23	236.04	22.89	267.12
25	1"	26.93	479.46	30.6	619.11	33.87	758.69	36.04	858.62
40	1½"	67.51	1 878.2	76.72	2 150.7	84.93	2 395.3	90.35	2 557.7
50	2"	116.89	3 251.7	132.82	3 723.4	147.03	4 147	156.42	4 428.1
80	3"	256.03	7 122.4	290.93	8 155.8	322.06	9 083.7	342.62	9 699.3
100	4"	439.91	12 238	499.9	14 013	553.38	15 608	588.69	16 666
150	6"	996.62	27 725	1 132.5	31 747	1 253.7	35 359	1 333.7	37 756
200	8"	1 872.1	52 079	2 127.3	59 634	2 354.9	66 419	2 505.2	70 921
250	10"	2 992.7	83 254	3 400.7	95 333	3 764.6	106 180	4 004.9	113 380
300	12"	4 346.5	120 920	4 939.1	138 460	5 467.5	154 210	5 816.5	164 660

Measuring range saturated steam: 15 to 100 psig

Overpressure [psig]		15		50		75		100	
Density [lb/ft³]		0.0719		0.1497		0.2036		0.2569	
Temperature [°F]		249.98		297.86		320.36		338.184	
Flow [lb/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ANSI B16.5								
15	½"	12.95	64.35	16.83	133.87	19.62	182.02	22.04	229.63
25	1"	26.25	206.83	37.86	430.3	44.15	585.06	49.59	738.09
40	1½"	65.81	829.61	94.92	1 726	110.68	2 346.7	124.32	2 960.5
50	2"	113.94	1 436.3	164.34	2 988	191.63	4 062.9	215.23	5 125.6
80	3"	249.57	3 146.1	360	6 545.3	419.74	8 899.4	471.45	11 227
100	4"	428.81	5 405.7	618.51	11 246	721.21	15 291	810.06	19 291
150	6"	971.47	12 246	1 401.2	25 478	1 633.9	34 642	1 835.2	43 703
200	8"	1 824.8	23 004	2 632.1	47 859	3 069.1	65 072	3 447.2	82 092
250	10"	2 917.2	36 774	4 207.7	76 508	4 906.4	104 030	5 510.8	131 230
300	12"	4 236.8	53 410	6 111.1	111 120	7 125.8	151 080	8 003.6	190 600

Measuring range saturated steam: 150 to 300 psig

Overpressure [psig]		150		200		250		300	
Density [lb/ft³]		0.3627		0.4681		0.5735		0.6792	
Temperature [°F]		366.08		388.04		406.22		422.06	
Flow [lb/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ANSI B16.5								
15	½"	27.79	324.21	35.86	418.47	43.94	512.66	52.04	607.12
25	1"	58.93	1 042.1	66.94	1 345.1	74.1	1 647.8	80.63	1 951.5
40	1½"	147.72	4 107.2	167.83	4 702.8	185.76	5 237	202.15	5 728
50	2"	255.75	7 111.9	290.56	8 141.9	321.6	9 066.8	350	9 917
80	3"	560.19	15 578	636.44	17 834	704.43	19 860	766.6	21 722
100	4"	962.54	26 766	1 093.5	30 643	1 210.4	34 124	1 317.2	37 324
150	6"	2 180.6	60 639	2 477.4	69 421	2 742.1	77 307	2 984	84 556
200	8"	4 096.1	113 900	4 653.6	130 400	5 150.7	145 210	5 605.2	158 830
250	10"	6 548.1	182 090	7 439.3	208 460	8 234.1	232 140	8 960.6	253 910
300	12"	9 510.2	264 460	10 805	302 760	11 959	337 150	13 014	368 770

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Overview



SITRANS FVA250 variable area meter

Benefits

- Standard design available at short notice
- Robust all-metal fitting with impact-resistant housing cover
- Can also be used for corrosive and flammable media
- Use possible at high pressures and temperatures
- Product and percentage scales
- Can be optionally fitted with heating and cooling sheaths
- Contamination-insensitive guiding of float

Application

The devices are particularly suitable for measuring:

- Water
- Liquids
- Anti-corrosives and lubricants
- Solvents
- Saturated and superheated steam
- Food and beverages
- Industrial gases

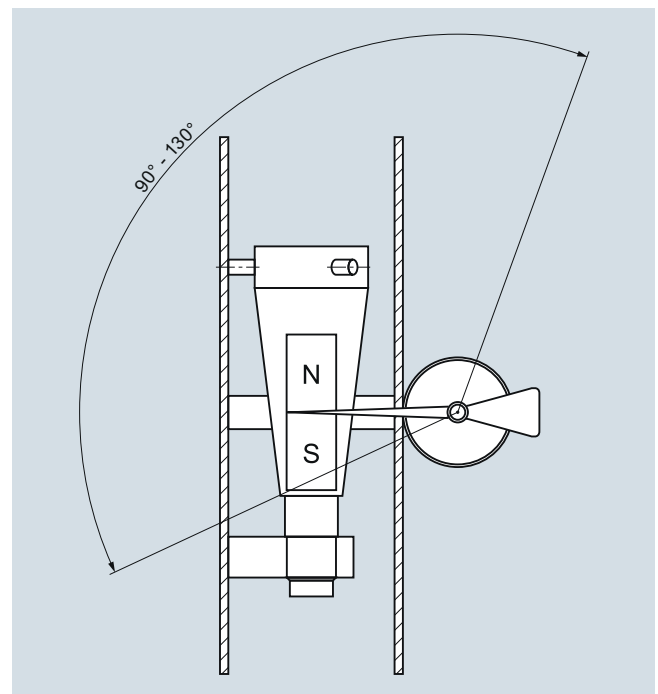
Design

Due to its full metal design, the SITRANS FVA250 variable area meter with a standard length of 250 mm (9.84 inch) can be used to measure many different types of liquids and gases passing through closed piping. The robust design means that it can also be used in harsh conditions. The various types of flange connections, linings and float materials satisfy the requirements of the pharmaceutical and chemical industries.

The measured value is displayed directly on the scale with the standard version. For process monitoring and control, the device can be equipped with a transmitter (MEM) as well as limit switches.

Function

Flow measurement with the SITRANS FVA250 is performed according to the float principle. The flowing medium lifts the conical float in the measuring ring. This increases the ring gap until an equilibrium is established between the buoyant force of the medium and the weight of the float. The height of the float is directly proportional to the flow rate. The movement of the float is transmitted from one magnet in the measuring tube to another magnet in the display unit outside of the measuring tube.



Measuring cone/scale angle

Technical specifications

Application	See page 3/410
Design and function	See page 3/410
Measuring principle	Variable area flowmeter
Input	
Measuring range	See table on page 3/412
Pressure rating	PN 16 ... PN 100 (232 ... 1450 psi) depending on version (see table on page 3/412)
Installation/flow direction	Vertical/from bottom to top
Rated operating conditions	
Ambient temperature	
• With local display	-40 ... +80 °C (-40 ... +176 °F)
• With limit switches	-40 ... +65 °C (-40 ... +149 °F)
• With electric remote encoder (MEM)	-40 ... +70 °C (-40 ... +156 °F)
Measuring accuracy	
• For liquids	± 1.6%
• For gases	± 2.0%
Reproducibility	0.5 % of the measuring range limit (URV)
Operating temperature	see page 3/412
Operating pressure	Min. operating pressure > 2x pressure drop (see table on page 3/412)
Design	
Flanges	EN 1092-1, ANSI B16.5
Material	
• Fitting	Stainless steel 1.4404/316L
• Float	Stainless steel 1.4404/316L, Hastelloy, PTFE
• Wetted parts materials	Stainless steel 1.4404/316L, PTFE, Hastelloy, depending on version
Degree of protection (display unit)	
• Display unit made of aluminum	IP65
• Display unit made of stainless steel	IP66
Electromagnetic immunity	
• EN 61000-6-2: 1999	Interference immunity industrial sector
• EN 50081-1	Emitted interference residential sector
• EN 55011: 1998 + A1: 1999	Group 1, Class B
• NAMUR recommendation	NE 21

Classification according to pressure equipment directive (DGRL 97/23/EG)

	Article No. 7ME5822- 7ME5823-	Permissible media	Category
DN 15	xAxxx-xxxx	Gases of fluid group 1 and liquids of fluid group 1	Article 3.3
DN 20	xFxxx-xxxx		Article 3.3
DN 25	xBxxx-xxxx		Article 3.3
DN 32	xGxxx-xxxx		III
DN 40	xHxxx-xxxx		III
DN 50	xCxxx-xxxx		III
DN 65	xJxxx-xxxx		III
DN 80	xDxxx-xxxx		III
DN 100	xExxx-xxxx		III

Technical specifications of contacts

Limit switch	
Cable gland	M20x1.5
Auxiliary power supply	5 ... 25 V DC
Isolation (2 contacts)	Electrically isolated
Limit switch	SJ3.5-N-BU
• Switching function	NAMUR NC
Nominal voltage U ₀	8.2 V DC (R _i approx. 1 kΩ)
Explosion protection	II 2G EEx ia IIC T6 - T4
EC-Type Examination Certificate for Directive 94/9/EG	PTB 99 ATEX 2219 X
Transmitter (MEM) with 4 ... 20 mA, pulse output and limit switch	
Cable gland	M20x1.5
Auxiliary power supply	14 ... 30 V DC
Analog output	4 ... 20 mA (2-wire technology)
Binary output	Pulses, limit switch
• Pulses	Max. pulse rate 10 Hz
• Limit switch	SJ3.5-N-BU (NAMUR, NC)
Temperature influence	≤ ± 0.5 % of the measuring range limit (URV)/10 K
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075
Transmitter (MEM) PROFIBUS PA	
Cable gland	M20x1.5
Auxiliary power supply	10 ... 25 V DC
Basic current	< 16.5 mA
Fault current	< 18 mA
Transfer rate	31.25 kBaud
Temperature influence	≤ ± 0.5 % of the measuring range limit (URV)/10 K
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075

Float damping

Float damping is recommended

- Generally for gas measurement
- When air bubbles in the medium cannot be avoided.
- When there are pressure surges in the lines caused by a delay in the flow, for example, due to rapid throttling or blocking
- When turbulence, pulsations or other instabilities cause the float to vibrate.
- When the flow pressure cannot be built up slowly
- When vibrations in the line cannot be avoided

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Technical specifications (continued)

Permitted measuring ranges

Version	CF-S	EF-H	FF-P
Wetted parts materials	Mat. no. 1.4404/316L	Hastelloy C	PTFE
Fitting	Mat. no. 1.4404/316L	≤ DN 25 (1"): Hastelloy > DN 25 (1"): Hastelloy/stainless steel 1.4404/316L	Mat. no. 1.4404/316L with PTFE lining
Flange	Mat. no. 1.4404/316L	≤ DN 25 (1"): Hastelloy > DN 25 (1"): Hastelloy/Edelstahl 1.4404/316L	Mat. no. 1.4404/316L
Float/flow tube	Mat. no. 1.4404/316L	Hastelloy	PTFE
Max. media temperature	-20 ... +200 °C (-4 ... +392 °F) (optional -80 ... +350 °C (-112 ... +662 °F))		-20 ... +125 °C (-4 ... +257 °F)
Nominal pressure	DN15 ... 80 (½ ... 3"): PN 40 (580 psi) DN100 (4"): PN 16 (232 psi) optional up to 400 bar (5800 psi)	DN15 ... 80 (½ ... 3"): PN 40 (580 psi) DN100 (4"): PN 16 (232 psi) optional up to 400 bar (5800 psi)	PN 16 (232 psi)
Reference data for measuring range specifications	Fluid in l/h with density: 1,0 kg/l, temperature 20 °C (68 °F), viscosity: 1 mPa·s Gas in m ³ /h with density: 1.293 kg/m ³ , temperature 0 °C (32 °F), viscosity: 0,0181 mPa·s, p _e = 0 bar (0 psi)		

Order code	Pressure loss [mbar]							Measuring ranges (dynamic 1:10)			
	Flow tube							Liquids		Gases	
	1	2	3	4	5	6	7	[l/h]	[USgpm]	[m ³ /h]	[scfm]
10	40 ¹⁾	40 ²⁾	-	-	-	-	-	0.5 ... 5	0.0022 ... 0.022	0.015 ... 0.15	0.0088 ... 0.088
11	44 ¹⁾	44 ²⁾	-	-	-	-	-	0 ... 10	0.0044 ... 0.044	0.03 ... 0.3	0.0177 ... 0.177
12	40 ¹⁾	40 ²⁾	-	-	-	-	-	1.6 ... 16	0.007 ... 0.07	0.045 ... 0.48	0.0265 ... 0.283
13	40 ¹⁾	40 ²⁾	-	-	-	-	-	2.5 ... 25	0.011 ... 0.11	0.075 ... 0.75	0.0441 ... 0.441
14	40 ¹⁾	40 ²⁾	-	-	-	-	-	4 ... 40	0.018 ... 0.18	0.13 ... 1.3	0.0765 ... 0.765
15	-	40 ²⁾	-	-	-	-	-	5 ... 50	0.022 ... 0.22	0.15 ... 1.5	0.0883 ... 0.883
16	-	40 ²⁾	-	-	-	-	-	7 ... 70	0.031 ... 0.31	0.2 ... 2.1	0.12 ... 1.24
17	-	60	60 ³⁾	-	-	-	-	10 ... 100	0.044 ... 0.44	0.3 ... 3	0.177 ... 1.77
20	-	60	60 ³⁾	-	-	-	-	16 ... 160	0.07 ... 0.7	0.5 ... 4.6	0.29 ... 2.71
21	-	60	60 ³⁾	-	-	-	-	25 ... 250	0.11 ... 1.1	0.7 ... 7	0.412 ... 4.12
22	-	70	70 ³⁾	-	-	-	-	40 ... 400	0.176 ... 1.76	1.0 ... 11	0.589 ... 6.47
23	-	80	80 ³⁾	-	-	-	-	60 ... 600	0.264 ... 2.64	1.7 ... 17	1 ... 10
24	-	-	60	-	-	-	-	100 ... 1 000	0.44 ... 4.4	2 ... 30	1.77 ... 17.66
25	-	-	70	-	-	-	-	160 ... 1 600	0.7 ... 7	3 ... 46	2.35 ... 27.07
26	-	-	100	50 ²⁾	-	-	-	250 ... 2 500	1.1 ... 11	6 ... 70	4.12 ... 41.2
27	-	-	240 ²⁾	120 ²⁾	80	-	-	400 ... 4 000	1.76 ... 17.6	10 ... 110	6.47 ... 64.74
30	-	-	-	180 ²⁾	90	-	-	600 ... 6 000	2.64 ... 26.4	16 ... 170	10 ... 100
31	-	-	-	-	110	-	-	1 000 ... 10 000	4.4 ... 44	28 ... 290	17.1 ... 170.7
32	-	-	-	-	230	70	-	1 600 ... 16 000	7 ... 70	45 ... 460	27.1 ... 270.7
33	-	-	-	-	230	70 ²⁾	-	2 000 ... 20 000	8.8 ... 88	55 ... 550	32.4 ... 323.7
34	-	-	-	-	500 ²⁾	100	-	2 500 ... 25 000	11 ... 110	69 ... 700	41.2 ... 412
35	-	-	-	-	-	350 ²⁾	120	4 000 ... 40 000	17.6 ... 176	109 ... 1 100	64.7 ... 647.4
36	-	-	-	-	-	350 ²⁾	120 ²⁾	5 000 ... 50 000	22 ... 220	134 ... 1 350	79.5 ... 794.6
37	-	-	-	-	-	-	360 ²⁾	6 000 ... 60 000	26.4 ... 264	169 ... 1 700	100 ... 1 000
40	-	-	-	-	-	-	600 ²⁾	8 000 ... 80 000	35.2 ... 352	239 ... 2 400	141.3 ... 1 413
41	-	-	-	-	-	-	600 ²⁾	10 000 ... 100 000	44 ... 440	299 ... 3 000	176.6 ... 1 766

- Not available

1) Not available for EF-H and FF-P.

2) Not available for FF-P.

3) Not available for CF-S and EF-H.

Note: Female thread connection (DIN ISO 228. NPT ANSI B 1.20.1) not available for FF-P.

Permitted nominal diameters

Order Code	Flange		Flow tube						
	EN 1092-1	ANSI B16.5	1	2	3	4	5	6	7
A	DN 15	1/2"	• ¹⁾	•	• ²⁾	–	–	–	–
B	DN 20	3/4"	• ¹⁾	• ²⁾	• ²⁾	–	–	–	–
C	DN 25	1"	• ¹⁾	• ²⁾	•	• ²⁾	–	–	–
D	DN 32	1 1/4"	• ¹⁾	• ²⁾	• ²⁾	• ²⁾	–	–	–
E	DN 40	1 1/2"	• ¹⁾	• ²⁾	• ²⁾	• ²⁾	–	–	–
F	DN 50	2"	• ¹⁾	• ²⁾	• ²⁾	• ²⁾	•	–	–
G	DN 65	2 1/2"	–	–	•	•	• ²⁾	–	–
H	DN 80	3"	–	–	–	•	• ²⁾	•	–
J	DN 100	4"	–	–	–	–	• ²⁾	• ²⁾	•

Order Code	Female thread		Flow tube						
	DIN ISO 228	NPT ANSI B 1.20.1	1	2	3	4	5	6	7
Q	G 1/4"	1/4" NPT	•	•	–	–	–	–	–
R	G 3/8"	3/8" NPT	•	•	–	–	–	–	–
S	G 1/2"	1/2" NPT	•	•	•	•	–	–	–
T	G 3/4"	3/4" NPT	•	•	•	•	–	–	–
U	G 1"	1" NPT	•	•	•	•	•	–	–
V	G 1 1/4"	1 1/4" NPT	•	•	–	•	•	–	–
W	G 1 1/2"	1 1/2" NPT	–	–	–	•	•	–	–
X	G 2"	2" NPT	–	–	–	–	•	–	–

• Available

– Not available

1) Not available for EF-H and FF-P.

2) Not available for FF-P.

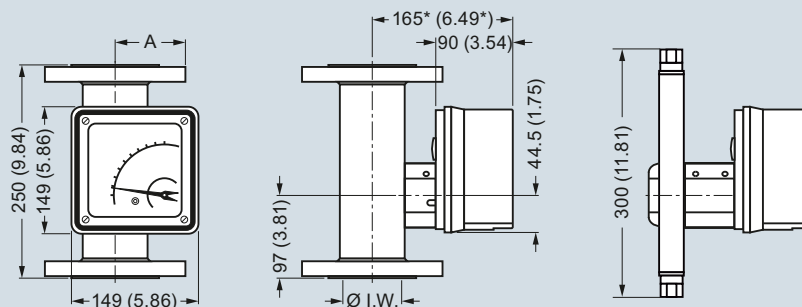
Note: Female thread connection (DIN ISO 228, NPT ANSI B 1.20.1) not available for FF-P.

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

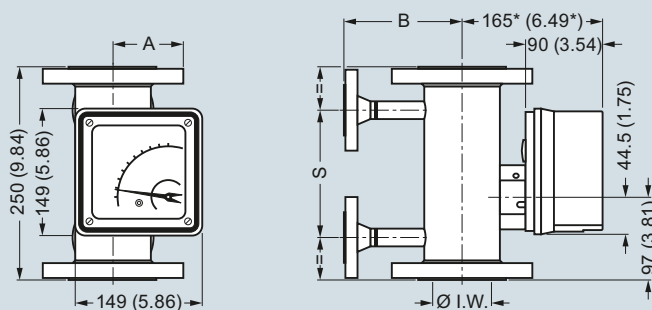
Dimensional drawings



EN 1092-1	ANSI B16.5	I. W.		A		Weight			
		mm	inch	mm	inch	kg	lb		
DN 15	PN 40	½"	class 150	26	1.02	74	2.91	3.0	6.6
DN 20	PN 40	¾"	class 150	26	1.02	74	2.91	3.0	6.6
DN 25	PN 40	1"	class 150	32	1.26	77	3.03	4.2	9.3
DN 32	PN 40	1¼"	class 150	32	1.26	77	3.03	5.2	11.5
DN 40	PN 40	1½"	class 150	46	1.81	88	3.46	6.0	13.2
DN 50	PN 40	2"	class 150	70	2.76	97	3.82	7.5	16.5
DN 65	PN 16	2½"	class 150	70	2.76	97	3.82	8.5	18.7
DN 80	PN 16	3"	class 150	102	4.02	113	4.45	13	28.7
DN 100	PN 16	4"	class 150	125	4.92	126	4.96	18	39.7

* +100 mm (3.94 inch) with displaced display unit

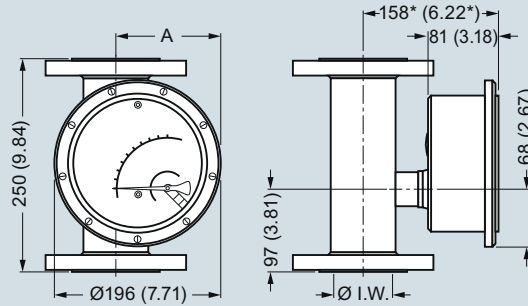
SITRANS FVA250, enclosure of display unit made of aluminum, dimensions in mm (inch)



Nominal diameter	B (flange)		B (Ermeto)		S		Weight		
	mm	inch	mm	inch	mm	inch	kg	lb	
DN 15	½"	110	4.33	53	2.09	150	5.91	3.0	6.6
DN 20	¾"	110	4.33	53	2.09	150	5.91	3.0	6.6
DN 25	1"	110	4.33	58.5	2.3	150	5.91	4.2	9.3
DN 32	1¼"	110	4.33	58.5	2.3	150	5.91	5.2	11.5
DN 40	1½"	130	5.12	63	2.48	150	5.91	6.0	13.2
DN 50	2"	140	5.51	77.5	3.05	150	5.91	7.5	16.5
DN 65	2½"	140	5.51	77.5	3.05	150	5.91	8.5	18.7
DN 80	3"	160	6.3	93.5	3.68	150	5.91	13	28.7
DN 100	4"	175	6.89	110	4.33	120	4.72	18	39.7

* +100 mm (3.94 inch) with displaced display unit

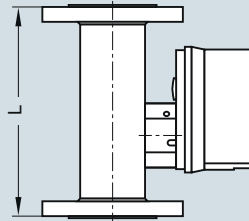
SITRANS FVA250, enclosure of display unit made of aluminum with heating connection, dimensions in mm (inch)



EN 1092-1		ANSI B16.5		I. W.		A		Gewicht	
				mm	inch	mm	inch	kg	lb
DN 15	PN 40	½"	class 150	26	1.02	103	4.06	3.0	6.6
DN 20	PN 40	¾"	class 150	26	1.02	103	4.06	3.0	6.6
DN 25	PN 40	1"	class 150	32	1.26	105	4.13	4.2	9.3
DN 32	PN 40	1¼"	class 150	32	1.26	105	4.13	5.2	11.5
DN 40	PN 40	1½"	class 150	46	1.81	115	4.53	6.0	13.2
DN 50	PN 40	2"	class 150	70	2.76	129	5.08	7.5	16.5
DN 65	PN 16	2½"	class 150	70	2.76	129	5.08	8.5	18.7
DN 80	PN 16	3"	class 150	102	4.02	145	5.71	13	28.7
DN 100	PN 16	4"	class 150	125	4.92	158	6.22	18	39.7

* +100 mm (3.94 inch) with displaced display unit

SITRANS FVA250, enclosure of display unit made of stainless steel, dimensions in mm (inch)



Nominal diameter	EN 1092-1				Nominal diameter	ANSI B16.5		
	PN 16	PN 40	PN63	PN100		class 150	class 300	class 600
DN 15	-	250 (9.84)	-	250 (9.84)	½"	250 (9.84)	250 (9.84)	250 (9.84)
DN 20	-	250 (9.84)	-	250 (9.84)	¾"	250 (9.84)	250 (9.84)	250 (9.84)
DN 25	-	250 (9.84)	-	250 (9.84)	1"	250 (9.84)	250 (9.84)	250 (9.84)
DN 32	-	250 (9.84)	-	250 (9.84)	1¼"	250 (9.84)	250 (9.84)	250 (9.84)
DN 40	-	250 (9.84)	-	250 (9.84)	1½"	250 (9.84)	250 (9.84)	250 (9.84)
DN 50	-	250 (9.84)	250 (9.84)	300 (11.81)	2"	250 (9.84)	250 (9.84)	300 (11.81)
DN 65	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	2½"	250 (9.84)	300 (11.81)	300 (11.81)
DN 80	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	3"	250 (9.84)	300 (11.81)	300 (11.81)
DN 100	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	4"	250 (9.84)	300 (11.81)	300 (11.81)

- not available

Build-in length of fitting in dependance of nominal diameter and pressure rating, dimensions mm (inch)

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and ordering data

Article No.

SITRANS FVA250 Full metal variable area meter

7 ME 5 8 6 - - - - -

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Flow tube

Liquid	Gas
5 ... 40 l/h	0.15 ... 1.3 m ³ /h
50 ... 600 l/h	1.5 ... 17 m ³ /h
1 000 ... 4 000 l/h	30 ... 110 m ³ /h
2.5 ... 6 m ³ /h	70 ... 170 m ³ /h
4 ... 25 m ³ /h	30 ... 700 m ³ /h
16 ... 50 m ³ /h	460 ... 1 350 m ³ /h
60 ... 100 m ³ /h	1 700 ... 3 000 m ³ /h

1
2
3
4
5
6
7

Design

Type: CF-S (standard)

Fitting: Stainless steel 1.4404/316L,

Flange: Stainless steel 1.4404/316L

Float: Stainless steel 1.4404/316L

Type: EF-H

Fitting: Stainless steel 1.4404/316L,

Flange: Stainless steel 1.4404/316L with Hastelloy lining

Float: Hastelloy

Type: FF-P

Fitting: Stainless steel 1.4404/316L,

Flange: Stainless steel 1.4404/316L with PTFE lining

Float: PTFE

2
4
5

Nominal diameter

DN 15/ANSI ½"

DN 20/ANSI ¾"

DN 25/ANSI 1"

DN 32/ANSI 1¼"

DN 40/ANSI 1½"

DN 50/ANSI 2"

DN 65/ANSI 2½"

DN 80/ANSI 3"

DN 100/ANSI 4"

Female thread ¼"

Female thread 3/8"

Female thread ½"

Female thread ¾"

Female thread 1"

Female thread 1¼"

Female thread 1½"

Female thread 2"

A
B
C
D
E
F
G
H
J
Q
R
S
T
U
V
W
X

Flange/thread standard - pressure rate

EN 1092-1, PN 16, Form B1

EN 1092-1, PN 40, Form B1

EN 1092-1, PN 63, Form B2

EN 1092-1, PN 100, Form B2

ANSI B16.5, class 150 RF

ANSI B16.5, class 300 RF

ANSI B16.5, class 600 RF

Female thread G DIN ISO 228

Female thread NPT ANSI B1.20.1

B
D
E
F
J
K
L
T
N

Selection and ordering data				Article No.
SITRANS FVA250 Full metal variable area meter				7ME586 - - - - -
Measuring ranges				
<u>Liquids</u>		<u>Gases</u>		
l/h	(USgpm)	m ³ /h	(scfm)	
0.5 ... 5	(0.0022 ... 0.022)	0.015 ... 0.15	(0.0088 ... 0.088)	1 0
0 ... 10	(0.0044 ... 0.044)	0.03 ... 0.3	(0.0177 ... 0.177)	1 1
1.6 ... 16	(0.007 ... 0.07)	0.045 ... 0.45	(0.0265 ... 0.283)	1 2
2.5 ... 25	(0.011 ... 0.11)	0.075 ... 0.75	(0.0441 ... 0.441)	1 3
4 ... 40	(0.018 ... 0.18)	0.13 ... 1.3	(0.0765 ... 0.765)	1 4
5 ... 50	(0.022 ... 0.22)	0.15 ... 1.5	(0.0883 ... 0.883)	1 5
7 ... 70	(0.031 ... 0.31)	0.2 ... 2	(0.12 ... 1.24)	1 6
10 ... 100	(0.044 ... 0.44)	0.3 ... 3	(0.177 ... 1.77)	1 7
16 ... 160	(0.07 ... 0.7)	0.5 ... 5	(0.29 ... 2.71)	2 0
25 ... 250	(0.11 ... 1.1)	0.7 ... 7	(0.412 ... 4.12)	2 1
40 ... 400	(0.176 ... 1.76)	1.0 ... 11	(0.589 ... 6.47)	2 2
60 ... 600	(0.264 ... 2.64)	1.7 ... 17	(1 ... 10)	2 3
100 ... 1 000	(0.44 ... 4.4)	2 ... 30	(1.77 ... 17.66)	2 4
160 ... 1 600	(0.7 ... 7)	3 ... 46	(2.35 ... 27.07)	2 5
250 ... 2 500	(1.1 ... 11)	6 ... 70	(4.12 ... 41.2)	2 6
400 ... 4 000	(1.76 ... 17.6)	10 ... 110	(6.47 ... 64.74)	2 7
600 ... 6 000	(2.64 ... 26.4)	16 ... 170	(10 ... 100)	3 0
1 000 ... 10 000	(4.4 ... 44)	28 ... 290	(17.1 ... 170.7)	3 1
1 600 ... 16 000	(7 ... 70)	45 ... 460	(27.1 ... 270.7)	3 2
2 000 ... 20 000	(8.8 ... 88)	55 ... 550	(32.4 ... 323.7)	3 3
2 500 ... 25 000	(11 ... 110)	69 ... 700	(41.2 ... 412)	3 4
4 000 ... 40 000	(17.6 ... 176)	109 ... 1 100	(64.7 ... 647.4)	3 5
5 000 ... 50 000	(22 ... 220)	134 ... 1 350	(79.5 ... 794.6)	3 6
6 000 ... 60 000	(26.4 ... 264)	169 ... 1 700	(100 ... 1 000)	3 7
8 000 ... 80 000	(35.2 ... 352)	239 ... 2 400	(141.3 ... 1 413)	4 0
10 000 ... 100 000	(44 ... 440)	299 ... 3 000	(176.6 ... 1 766)	4 1
Display unit / process temperature				
Standard (aluminum) - up to 200 °C with local display/150 °C with electrical output				0
Standard (aluminum) with displaced display - up to 350 °C with local display and electrical outputs				1
Stainless steel IP66 - up to 200 °C with local display/150 °C with electrical outputs				2
Stainless steel IP66 with displaced display - up to 350 °C with local display and electrical outputs				3
Heating/cooling sheath				
Without (standard)				A
With flange connection EN1092-1 DN 15 PN 40				B
With flange connection ½ " ANSI B16.5 Class 150 RF				C
Display/outputs				
With display				A
With display, 1 inductive contact (limit switch) SJ 3.5N				B
With display, 2 inductive contacts (limit switches) SJ 3.5N				C
With display, HART and 4 to 20 mA				D
With display, HART, 4 to 20 mA, 2 inductive contacts SJ 3.5N				E
With display, HART, 4 to 20 mA, 1 inductive contact, 1 pulse output				F
With display, PROFIBUS PA				G
Calibration				
Standard calibration				0
• Without calibration certificate				1
• With calibration certificate				1

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and ordering data	Order code
-----------------------------	------------

Other types of liquid and gas measurement

Please add "-Z" to Article No. and specify Order code.

Marking of name plate

Name plate in English

B11

Certificates

Certificate of compliance EN 10204-2.1

C10

Factory inspection certificate EN 10204-2.2

C11

Acceptance test certificate 3.1 according to EN 10204

C12

Dye penetration test on pressure bearing weldings

C13

X-ray test of pressure bearing weldings

C14

Pressure test with acceptance test certificate 3.1 according to EN 10204

C15

PMI (positive material identification) test of pressure bearing metal parts

C16

Float damping

With float damping

D01

Specification of medium process data (specify in plain text)

Specification always required for each order:

Medium

Operating pressure

Operating temperature

Density (only for customer-specified medium)

Viscosity (only for customer-specified medium)

Measuring range

Y01

TAG plate

TAG plate in stainless steel (add plain text)

Y17

Cleaning to company standard

Cleaning Class 2, with identification free of oil and grease

K46

Cleaning Class 1, with identification free of oil, grease and silicon

K48

Approvals

With ATEX approval

M51




Special version (specify in plain text)

Y99

Note:

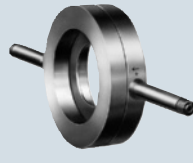
For possible combinations of nominal diameters and flow tube, see table on page 3/413

Primary differential pressure devices to DIN EN ISO 5167

		Nominal diameters	Nominal pressure
	Orifice plates with annular chambers	EN: DN 50 ... DN 1000 ASME: 2 inch ... 40 inch	EN: PN 6 ... PN 100 ASME: Class 150 ... 600
	Orifice plates with single tapplings	EN: DN 50 ... DN 500 ASME: 2 inch ... 20 inch	EN: PN 6 ... PN 315 ASME: Class 150 ... 2500
	Metering pipe • Orifice plate with annular chambers, mounted between flanges	EN: DN 10 ... DN 50 ASME: ½ inch ... 2 inch	EN: PN 10 ... PN 100 ASME: Class 150 ... 600

Further products for the complete setup for flow measurements with a primary differential pressure device,

e. g. an orifice plate



+

For **compensation vessels** (for steam), see chapter 1For **threaded flange pairs**, see chapter 1

+

For **initial shut-off valves**, see chapter 1

+

For **valve manifolds**, see chapter 1 e. g.

5-spindle valve manifold or



Valve manifold combination DN 8 for vapor measurement



+

For **SITRANS P DS III differential pressure transmitter**, see chapter 1Measuring cell options:
20, 60, 250, 600 and 1600 mbar

Overview

Primary differential pressure devices are standardized mechanical flow sensors, often also referred to as differential pressure transducers. The primary differential pressure devices are calculated and manufactured according to DIN EN ISO 5167.

Through constriction of the line diameter in the pressure device, the flow rate creates a differential pressure that is converted with the help of a differential pressure transmitter into a proportional current signal or flow value. The assignment of differential pressure to flow is created by means of a "calculation of the primary differential pressure device".

Primary differential pressure devices are suitable for single-phase media such as gas, vapor and liquids without solid components.

Requirement when ordering a primary differential pressure device

Always quote the orifice plate calculation and the classification according to the pressure equipment directive 97/23/EC (PED) when placing an order.

Orifice plate calculation - calculation protocol

For the "orifice plate calculation" service, you need to fill out the "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167". The intelligent "SITRANS F O questionnaire online" can be found in the PIA Life Cycle Portal at <http://www.siemens.com/pia-portal>.

For this purpose, you need to specify all the data of the measuring point, medium, process and pipe data, as well as details of installation conditions, flow conditions, permissible pressure losses and accuracy requirements.

We will be unable to carry out the calculation if there are any data missing. A calculation protocol with a consecutive number documents the calculation of the orifice plate. We require this calculation protocol from the customer for manufacturing purposes. It is to be included in the order for the orifice plate.

Important note:

The "Orifice Plate Calculation with Preparation of a Calculation Protocol" service is a separate process, and must be carried out before the orifice plate is ordered.

The calculation protocol issued by the customer is to be included in the order for the orifice plate.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Technical description

Classification in accordance with pressure equipment directive 97/23/EC (PED)

The pressure equipment directive must also be applied to the Orifice portfolio for use in Europe.

In compliance with the pressure equipment directive, equipment is divided into categories I to III or Article 3 paragraph 3 according to danger potential (medium/pressure/volume/nominal diameter).

Submission of this design data in accordance with pressure equipment directive 97/23/EC is mandatory for ordering and manufacture, and must be specified by customers in the orifice plate order.

The Article No. of the orifice plate contains the relevant Category I, II, III or Article 3 paragraph 3 in the Order code.

Detailed information is available under "Pressure equipment directive 97/23/EC".

How to order the "Orifice plate with appended calculation protocol" product

To order an orifice plate, you need to supply the following data:

- Complete Article No. of the orifice plate, including the respective Order code "Manufacture according to pressure equipment directive":
 - Category I, II, III or Article 3 paragraph 3 and the design data with Order Codes Y31 to Y35
 - Or without (only available outside Europe!)
- Appended "Calculation Protocol" issued by the customer with Order Code Y21 or Y22, or statement "Orifice plate without calculation" with Order Code Y01

The orifice plate can only be manufactured when it has been passed as a "clean order", i. e. it has been confirmed that the data of the Article No. match the data of the calculation protocol.

Benefits

- Primary differential pressure devices are suitable for universal use across the globe.
- Primary differential pressure devices are very robust and can be used in a wide range of nominal diameters.
- Suitable for high temperature and pressure ranges.
- No wet calibration required as they use an internationally standardized flow rate measurement procedure.
- The differential pressure transmitter can be used over a long distance from the measuring location.
- The differential pressure method is well known and has a large installed base.
- The SITRANS P differential pressure transmitter is easy to parameterize again if process data change. They are adapted by recalculating and assigning new parameters to the transmitter or, in the case of the version orifice plate with annular chamber, by using a new orifice disk.

Application

Power stations

Measurement of steam, condensate and water.

Petrochemical industry/Refineries

Measurement of water, steam and liquid and gas hydrocarbons.

Chemical industry

Measurement of various liquid and gas media.

Oil and gas industries

Measurement of liquid and gas hydrocarbons.

Design

Orifice plate with annular chambers

The version orifice plate with annular chambers comprises two support rings which are connected to the inside of the pipe over an annular chamber and an annular gap. Tapping sockets direct the differential pressure from the support rings to the differential pressure transmitter over shut-off fittings and differential pressure lines.

The orifice disk is inserted between the support rings together with a gasket.

Orifice plate with single tapplings

In the version of the orifice plate with single tapplings the orifice plate is a single unit. The inside of the tube is connected to the tapping sockets by two single tapplings.

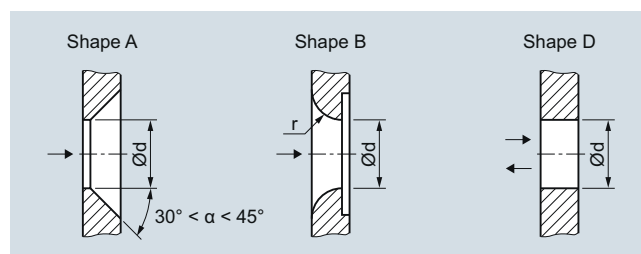
Both types of orifice plate are installed between two flanges in the pipeline.

Function

Mode of operation

The orifice plate creates a differential pressure. The pressure is transferred through the vertical columns of medium in the differential pressure lines to the measuring cell of the differential pressure transmitter. The transmitter converts the pressure signal with square-root characteristic into a flow-proportional current or into a digital signal, e. g. PROFIBUS.

Types of primary differential pressure devices



Shapes of the orifice disk aperture

The primary differential pressure devices are calculated and manufactured according to DIN EN ISO 5167. According to this, the application range of the standard orifice disk aperture form A is limited by the Reynolds number. The limits depend on the diameter ratio $\beta = d/D$. (D: internal diameter of pipe).

In the case of Reynolds numbers from approx. 500 to 2.5×10^5 and DN 40 to DN 150, the orifice disk aperture form B (quarter circle) can be used for slightly less accurate measurements. The profile radius r depends on the diameter ratio β and results from the calculation of the diameter of the orifice disk aperture d .

The cylindrical orifice disk aperture form D is used for measurements in both flow directions.

Tapping sockets

Type of threaded connections and welding connections dependent on the measured medium and the nominal pressure of the shut-off fitting

The type of socket connections depends on the measured medium and the nominal pressure of the shut-off fittings; the socket length depends on the nominal diameter (pipe diameter) of the primary differential pressure device and the operating temperature (because of the thermal insulation!). The socket position depends on the measured medium and the flow direction.

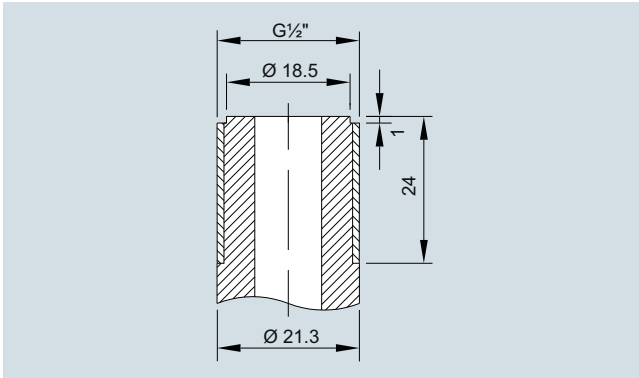
- With threaded connection G $\frac{1}{2}$ DIN ISO 228/1, connection dimensions to DIN 19207 Form V, for liquids and gases up to PN 160, for steam up to PN 100
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version acc. to ASME up to class 600
- With \varnothing 12 mm pipe connection for pipe union with ferrule
- With \varnothing 21.3 mm welding connection for liquids and gases up to PN 400, and for steam up to PN 100, or \varnothing 24 mm for liquids and gases over PN 400, and for steam over PN 100

Other connections on request.

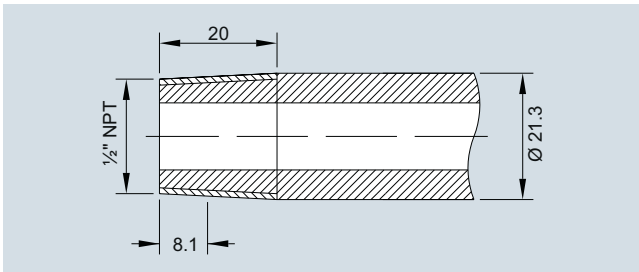
Length of tapping sockets

The length of the tapping sockets are specified in DIN 19205, Part 2.

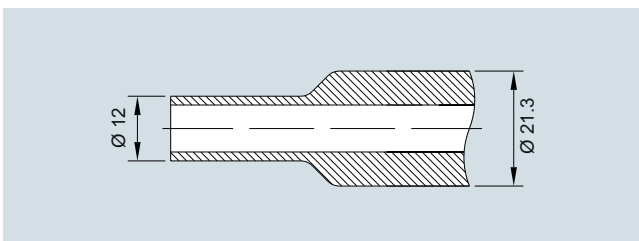
If using with high temperatures and stronger insulations, please quote the insulation thickness and the required length of the tapping sockets when placing an order.



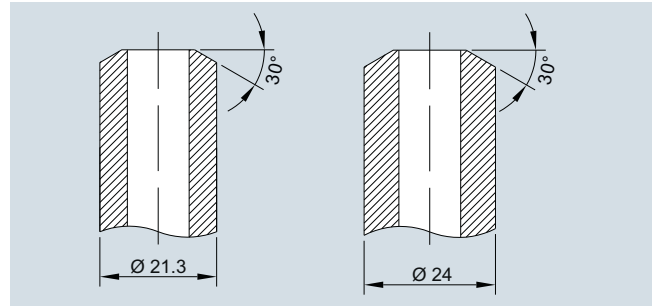
Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm



Threaded connection $\frac{1}{2}$ -14 NPT male, dimensions in mm



With \varnothing 12 mm pipe for pipe union with ferrule, dimensions in mm

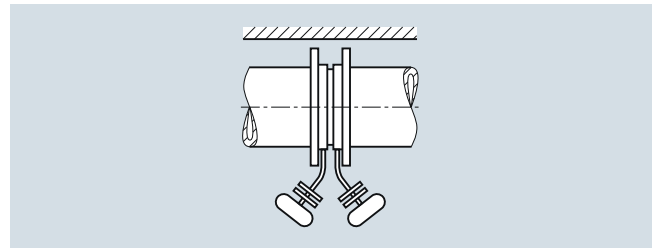


Welding connections of tapping sockets, dimensions in mm

Position of the tapping sockets

When measuring liquids and gases, the position of the tapping sockets must comply with the tables according to DIN 19205; when measuring steam, the compensation vessels must be at the same height.

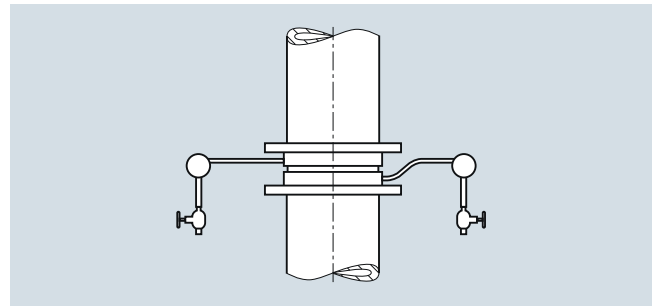
- Horizontal steam lines



Horizontal steam line in front of a wall with primary differential pressure device and valve combination; with annular chamber orifice plate or single part orifice plate with special length of 65 mm

In the case of horizontal steam lines, straight sockets are arranged opposite each other or, if the pipe is close to a wall, with bent sockets on one side.

- Vertical steam lines



Vertical steam line with primary differential pressure device and valve combination

In the case of vertical and inclined steam lines, the lower socket is bent upwards so that the connection flanges and compensation vessels are also at the same height.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Technical description

Extract from DIN 19205, Part 1, August 1988

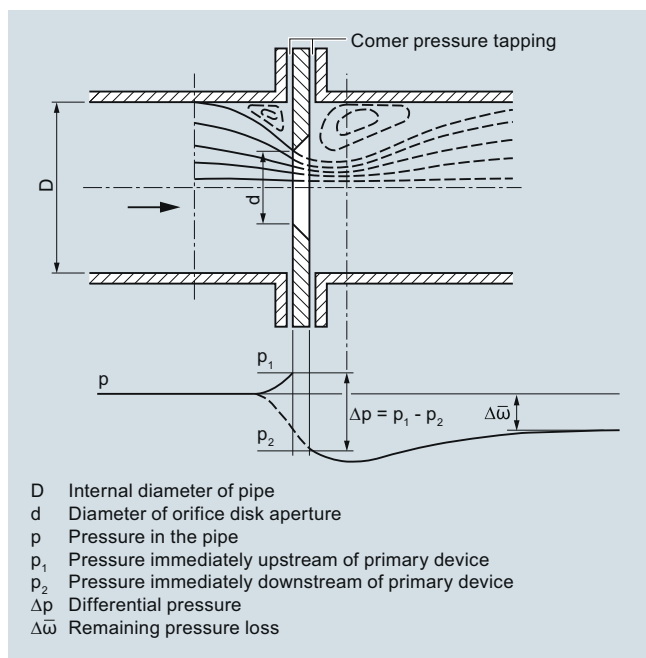
No.	Pipe position and flow direction	Position of the tapping sockets	Application
1	Horizontal →	180°	With compensation vessels
2 1)2)		0°	
3 1)2)			
4	Vertical Rising ↑	90°	Without compensation vessels
5	Falling ↓		
6	Rising ↑	180°	
7	Falling ↓		
10	Horizontal →	$<\gamma^{3)}$	Without compensation vessels
11	Horizontal, vertical	180°	
13	Vertical	90°	

1) Not possible with orifice plates with single tappings (overall length 40 mm). Special length of 65 mm is possible.

2) Only possible with orifice plates with annular chambers (overall length 65 mm) with bent tapping sockets.

3) Angle γ is dependent on the nominal pressure and nominal diameter in accordance with DIN 19 205.

Principle of the differential pressure method



Principle of the differential pressure method: Pressure curve at a pipe restriction

A primary differential pressure device is installed at the measuring point to measure the flow. This restricts the pipe and has two connections for sampling the differential pressure. If the properties of the primary device and the medium are known such that

the equation below can be evaluated, the differential pressure is a measure of the absolute flow. No reference measurements are required; the flow measurement can be checked independent of the device manufacturer.

The differential pressure method is based on the law of continuity and Bernoulli's energy equation.

According to the law of continuity, the flow of a moving medium in a pipeline is the same at all points. If the cross-section is reduced at one point, the flow velocity must increase at this point. According to Bernoulli's energy equation, the energy content of a flowing medium is constant and is the total of the static (pressure) and kinetic (movement) energies. An increase in the flow rate therefore results in a reduction in the static pressure (see the figure "Principle of the differential pressure method: Pressure curve at a pipe restriction"). This pressure difference Δp , the so-called differential pressure, is a measure of the flow.

In general the following equation applies: $q = c \sqrt{\Delta p}$

Where:

- q: flow (q_m , q_v) mass flow or volume flow
- Δp : Differential pressure
- c: Factor depending on the dimensions of the pipeline, the type of constriction, the density of the flowing medium etc.

According to this equation, the differential pressure created by the constriction is proportionally equal to the square of the flow (see the figure "Relationship between flow q and differential pressure Δp ").

Integration

The orifice plate is installed between two flanges in the pipeline. Using compensation vessels (for steam) and initial shut-off valves, the differential pressure of the high-pressure side and low-pressure side is directed through differential pressure lines to a multiple valve manifold and on to the differential pressure transmitter. For media with extreme pressure and temperature fluctuations it makes sense to take an additional measurement of the pressure and temperature in order to correct the flow signal of the transmitter in a subsequent correction computer.

Selection of mounting point

The flow measuring regulations DIN EN ISO 5167 not only consider the design of primary differential pressure devices, but also assume that their installation is in accordance with the standard so that the specified tolerances can be retained. The required inlet and outlet pipe sections according to ISO 5167 can be found in the calculation protocol of the respective orifice plate. Configuration of the pipeline should allow for standardized installation (required inlet and outlet pipe section). Particular attention must be paid to ensure that the primary device can be fitted in a sufficiently long straight section of pipe. Bends, valves and similar should be fitted sufficiently far upstream of the primary device to prevent them having a detrimental effect. Primary devices with a large diameter ratio are particularly sensitive to interferences.

Design of measuring point

The design of the measuring point depends on the medium and on the spatial conditions. The designs for gas and water only differ with regard to the position of the tapping sockets (see the figure "Measuring setup"); compensation vessels must also be provided for steam.

Metering pipes

On lines with small nominal diameters (DN 10 to DN 50) the measurements are influenced by the wall roughness and diameter tolerances of the pipes, far more so than by large nominal diameters. These influences are counteracted by using metering pipes with fitting inlet and outlet pipe sections made of precision pipes. For exact measurements with metering pipes, the flow coefficient C needs to be determined by means of calibration.

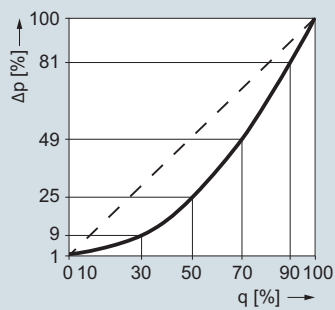
Options

Further versions that are available on request:

- Other types of primary differential pressure device: orifice plates without support rings, measurement flange orifice plates, venturi nozzles, classic venturi tubes etc.
- Other nominal diameters and nominal pressures to EN and ASME
- Other lengths, special lengths
- Other materials
- Sealing face with recess or groove
- Flushing rings
- Other tapping sockets, multiple tappings
- Material acceptance test certificates or cold water pressure tests

Characteristic curves

The orifice plate has a square-law relationship between differential pressure and flow. A square-root transmitter is required therefore to create a linear flow characteristic.



q	0	1	3	5	8	10	15	20	30	40	50	60	70	80	90	100	%
Δp	0	0,01	0,09	0,25	0,64	1	2,25	4	9	16	25	36	49	64	81	100	%

Setting range for application point of square-rooted characteristic for SITRANS P differential pressure transmitter

Relationship between flow q and differential pressure Δp

More information

- Standards
- Instruction Manual SITRANS P
- Installation Instructions

Flow Measurement

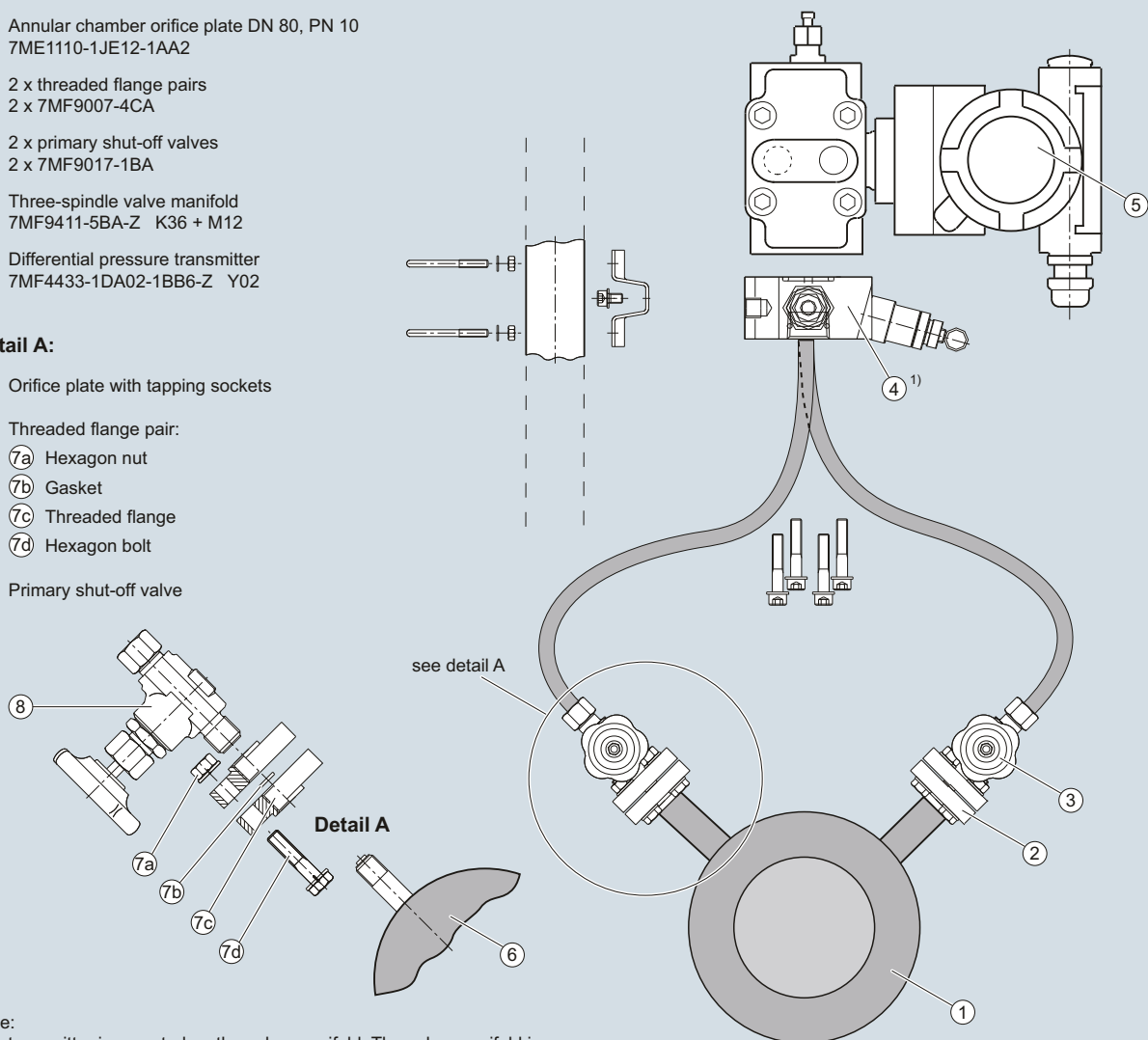
SITRANS F O delta p - Primary differential pressure devices

Technical description

- ① Annular chamber orifice plate DN 80, PN 10
7ME1110-1JE12-1AA2
- ② 2 x threaded flange pairs
2 x 7MF9007-4CA
- ③ 2 x primary shut-off valves
2 x 7MF9017-1BA
- ④ Three-spindle valve manifold
7MF9411-5BA-Z K36 + M12
- ⑤ Differential pressure transmitter
7MF4433-1DA02-1BB6-Z Y02

Detail A:

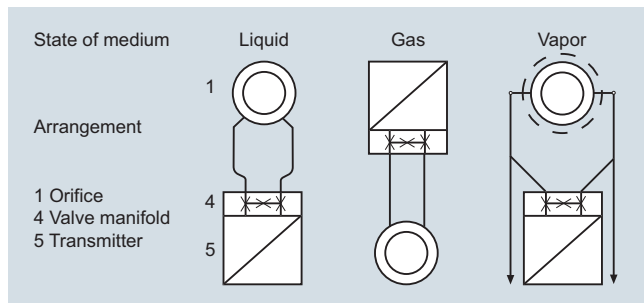
- ⑥ Orifice plate with tapping sockets
- ⑦ Threaded flange pair:
 - ⑦a Hexagon nut
 - ⑦b Gasket
 - ⑦c Threaded flange
 - ⑦d Hexagon bolt
- ⑧ Primary shut-off valve



Note:

The transmitter is mounted on the valve manifold. The valve manifold is mounted on the pipe (or wall).

Design of measuring point, example: gas measurement (non-corrosive, non-hazardous)



Measuring setup

Technical specifications

The technical properties of the orifice plates depend on the device:

- Nominal diameters
- Nominal pressure
- Materials
- Mass
- Temperature limits

Accessories

- Compensation vessels
- Threaded flange pairs
- Primary shut-offs
- Valve manifold
- Differential pressure lines (to be provided by the plant owner)
- Gaskets, bolts, screws (to be provided by the plant owner)
- Differential pressure transmitter

Overview

The pressure equipment directive 97/23/EC applies to the alignment of the statutory orders of the European member states for pressure equipment used within its European area of validity. Equipment as defined by the directive includes vessels, pipelines and accessories with a maximum permissible pressure of more than 0.5 bar above atmospheric pressure.

Application of the pressure equipment directive was optional from November 29, 1999 onwards and has been mandatory since May 29, 2002.

Categorization according to danger potential

In compliance with the pressure equipment directive, equipment is divided into categories I to III or Article 3 paragraph 3 according to danger potential (medium/pressure/volume/nominal diameter).

The following criteria are decisive for assessment of the danger potential and are also shown in the diagrams (see "Characteristic curves").

Fluid group	Group 1 or 2
Aggregate state	Liquid or gaseous
Type of pressurized equipment	Nominal diameter, pressure or product of pressure and nominal diameter (PS * DN)
• Pipeline	







Note

Liquids according to Article 3 are those liquids whose steam pressure is not more than 0.5 bar above standard atmospheric pressure (1013 mbar) at the maximum permissible temperature.

The maximum permissible temperature for the liquids used is the user-defined maximum process temperature. This must be within the limits defined for the equipment.

Categorization of media (liquid/gaseous) into fluid groups

In compliance with Article 9, fluids are divided into the following fluid groups:

Group 1	
	<u>Explosive</u> R phrases: e. g.: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44)
	<u>Extremely flammable</u> R phrases: e. g.: 12 (17)
	<u>Highly flammable</u> R phrases: e. g.: 11, 15, 17 (10, 30)
	<u>Very toxic</u> R phrases: e. g.: 26, 27, 28, 39 (32)
	<u>Toxic</u> R phrases: e. g.: 23, 24, 25 (29, 31)
	<u>Oxidizing</u> R phrases: e. g.: 7, 8, 9 (14, 15, 19)

Flammable (where the maximum allowable temperature is above flash-point).

Group 2

All fluids not belonging to Group 1.

Also applies to fluids which are e. g. dangerous to the environment, corrosive, dangerous to health, irritant or carcinogenic (if not highly toxic).

Conformity rating

Pressure equipment of categories I to IV must comply with the safety requirements of the directive and be assigned the CE symbol.

They must comply with a conformity rating procedure according to Appendix III of the directive.

Pressure equipment according to Article 3 paragraph 3 must be designed and manufactured in agreement with the sound engineering practice SEP applicable in a member country, and must not be assigned a CE symbol (CE symbols from other directives are not affected).

The manufacturer issues a declaration of conformity if the orifice plates are produced for use in the area covered by the PED and are assignable to the categories I, II or III. This declaration of conformity is given to the customer. Its contents depend on the design data of the customer's plant. The design data can only be provided by the operator/customer, and must be specified in the product order for the orifice plate.

Submission of the following design data is mandatory:

- Medium (name)
- Aggregate state (liquid or gas)
- Fluid group 1 or 2
- Max. permissible pressure (PS) of the plant (not PN)
- Max. permissible temperature TS of the plant (not operating temperature)
- Nominal diameter DN

Note

Equipment designed for media with a high danger potential (e.g. gases of fluid group 1) may also be used for media with a lower danger potential (e. g. gases of fluid group 2, or liquids of fluid groups 1 and 2).

The pressure equipment directive according to Article 1 paragraph 3 does not apply to equipment such as e. g. mobile offshore plants, ships, aircraft, water supply and waste water networks, nuclear plants, rockets and pipelines outside industrial plants.

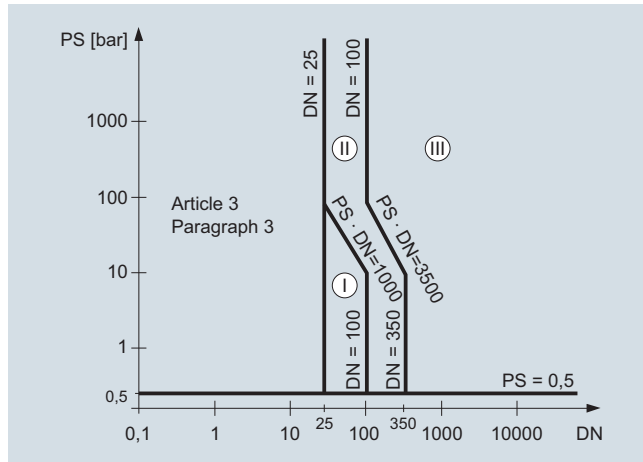
Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Pressure equipment directive 97/23/EC

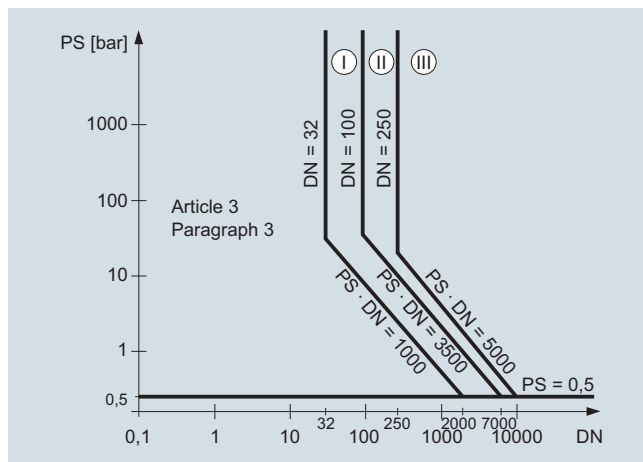
Characteristic curves

Gases of fluid group 1



Pipelines according to Article 3 Number 1.3 Letter a) First dash
Exception: Unstable gases (e.g. acetylene and ethylene) belonging to Categories I and II, must be included in Category III

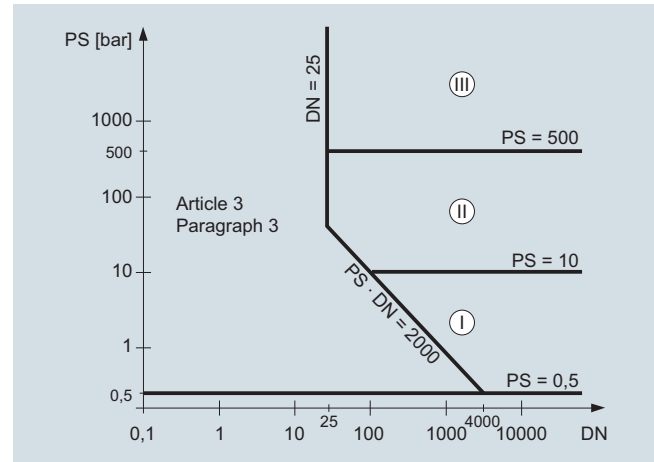
Gases of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter a) Second dash

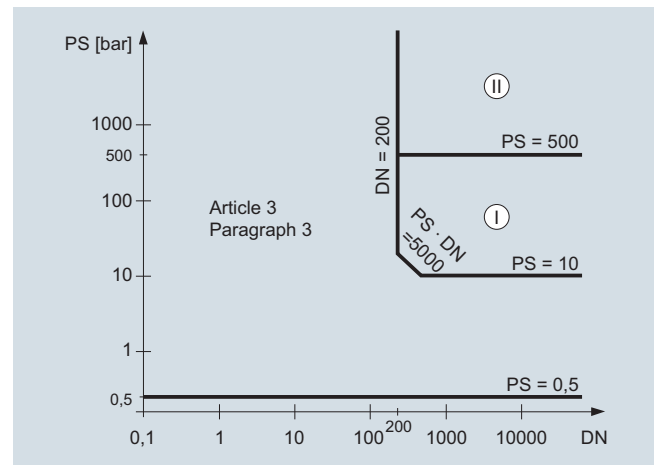
Exception: Liquids and steam, at temperatures > 350 °C belonging to Category II must be included in Category III.

Liquids of fluid group 1



Pipelines according to Article 3 Number 1.3 Letter b) First dash

Liquids of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter b) Second dash

Design data and product order for orifice plate

If the orifice plate is used in Europe the orifice plate is produced in accordance with the Pressure Equipment Directive 97/23/EC.

In this case the design data are mandatory for the production of an orifice plate and must be specified when ordering.

The required design data are specified in the article number of an orifice plate with the Order code Y31 to Y35.

The following design data are mandatory; data can only be provided by the operator/customer:

Data for production according to Pressure Equipment Directive 97/23/EC - for use in Europe	
Order code for ordering	Design data
Y31	<ul style="list-style-type: none"> • Medium/measured medium Name _____
Y32	<ul style="list-style-type: none"> • Aggregate state Liquid <input type="checkbox"/> Gaseous <input type="checkbox"/>
Y33	<ul style="list-style-type: none"> • Fluid group <ul style="list-style-type: none"> - Explosive - Highly, extremely flammable - Oxidizing - Toxic, highly toxic Group 1 <input type="checkbox"/> All others Group 2 <input type="checkbox"/>
Y34	<ul style="list-style-type: none"> • Maximum permissible pressure (<i>not PN</i>) PS¹⁾ _____ <input type="checkbox"/> bar <input type="checkbox"/> psi
Y35	<ul style="list-style-type: none"> - at the maximum permissible temperature TS²⁾ _____ <input type="checkbox"/> °C <input type="checkbox"/> °F <p>¹⁾ PS: Setting pressure of the safety mechanism (valve, bursting disk) ²⁾ TS: Range of the temperature limits</p>
The following are already defined by the article number:	
	<ul style="list-style-type: none"> • Nominal diameter DN _____ • Assignment of the category Annex II of the Pressure Equipment Directive contains 4 diagrams with which the associated category of the primary differential pressure devices can be determined (see page 3/426). <input type="checkbox"/> Article 3, Paragraph 3 <input type="checkbox"/> Category II <input type="checkbox"/> Category I <input type="checkbox"/> Category III

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

SITRANS F O questionnaire online

Overview

SITRANS F O questionnaire online

For the calculation of a primary differential device in accordance with DIN EN ISO 5167 and for the production of primary differential devices in accordance with the Pressure Equipment Directive 97/23/EC the required data (measuring point and customer-specific data) can be entered in the "SITRANS F O questionnaire online".

The intelligent "SITRANS F O questionnaire online" can be found in the PIA Life Cycle Portal at:

<http://www.siemens.com/pia-portal>.

All the data required for calculating a primary differential device - orifice plates, nozzles, Venturi nozzles and the classic Venturi tube - can be entered here and attached to the order for calculation of an orifice plate as a Microsoft Excel file.

All the necessary data for calculating a primary differential device are requested menu-driven and can be verified by a check function.

Numerous new features provide the user with essential benefits when using the questionnaire online:

- Clear structure of all necessary parameters
- Menu-driven input of data and values through automatic specification of parameters and units, in accordance with the selected design, the given measured medium and the selected optimization criterion.
- Explanatory and in-depth notes as description and explanation of the parameter
- Numerous input options of customer and measuring point specific supplementary conditions
- Verification of all mandatory input boxes
- Safe data storage of entered customer-specific parameters
- Print preview and print template
- Immediate dispatch of the completed questionnaire online by e-mail

Application

Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +400°C.

Design

- Two support rings with replaceable orifice disk form A, B or D (see types of primary differential pressure devices in "Technical description", "Function"); see Ordering data for materials
- Graphite gasket with noncorrosive metal foil insert between orifice disk and support ring outlet

Overall length

65 mm to DIN 19205

Nominal diameters

EN: DN 50 to DN 1000

ASME: 2 inch to 40 inch

Nominal pressure

EN: PN 6 to PN 100

ASME: class 150 to 600

Sealing face to the mating flanges

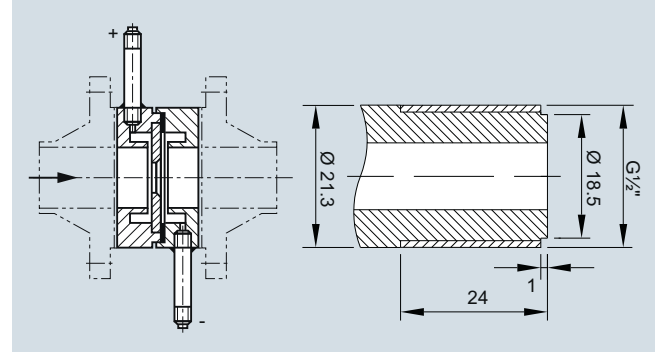
- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for version to ASME

Tapping sockets

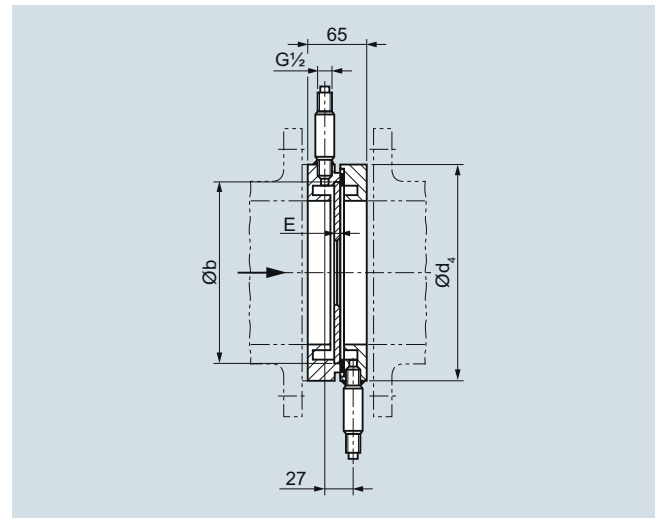
For the dimensions of the following tapping sockets, see "Function":

- With connection thread G $\frac{1}{2}$ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version to ASME
- With \varnothing 12 mm pipe connection for pipe union with ferrule
- With welding connection \varnothing 21.3 mm

See "Technical description" and "Function" for position of the tapping sockets.

Dimensional drawings

Orifice plate with annular chamber (above); tapping socket with threaded connection (below), dimensions in mm



Tapping socket: Socket length is fixed in accordance with the pressure and nominal diameter (DIN 19 205, Part 2).

- Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm

Versions for steam lines: See "Technical description", "Function" for position of the tapping sockets.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

Nominal diameter acc. to EN

DN	Inside diameter	External diameter d_4 / sealing face: plane, with recess or with groove.						
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100
50	43 ... 55	96	107	107	107	107	113	119
65	59 ... 71	116	127	127	127	127	138	144
80	73 ... 85	132	142	142	142	142	148	154
100	90 ... 108	152	162	162	168	168	174	180
125	114 ... 132	182	192	192	194	194	210	217
150	142 ... 160	207	218	218	224	224	247	257
200	185 ... 211	262	273	273	284	290	309	324
250	237 ... 262	317	328	329	340	352	364	391
300	285 ... 314	373	378	384	400	417	424	458
350	328 ... 362	423	438	444	457	474	486	512
400	380 ... 408	473	489	495	514	546	543	–
500	477 ... 514	578	594	617	624	628	–	–
600	581 ... 610	679	695	734	731	–	–	–
700	686 ... 710	784	810	804	833	–	–	–
800	776 ... 810	890	917	911	942	–	–	–
900	876 ... 910	990	1017	1011	1042	–	–	–
1000	976 ... 1010	1090	1124	1128	1154	–	–	–

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1, dimensions in mm and weights

DN	L				E	Weight (approx. in kg)	
	PN 6	PN 10 ... 25	PN 40	PN 63 ... 100		PN 6 ... 100	With smallest nominal pressure
50	79	79	79	79	2 ± 0.2	2.5	4.5
65	96	96	96	96	2 ± 0.2	3.4	6.4
80	115	115	115	115	4 ± 0.2	4.3	6.9
100	137	137	137	137	4 ± 0.25	4.7	8.6
125	164	164	164	164	4 ± 0.25	6.3	12.4
150	193	193	193	193	4 ± 0.29	7.0	17.0
200	247	247	247	247	4 ± 0.29	10.3	26.2
250	302	302	302	302	4 ± 0.32	13.1	36.6
300	354	354	354	354	4 ± 0.36	17.3	49.0
350	403	403	403	403	4 ± 0.4	25.0	63.0
400	452	452	452	452	4 ± 0.4	28.0	73.8
500	553	563	563	–	6 ± 0.4	36.2	65.9
600	659	659	–	–	6 ± 0.4	42.5	75.6
700	757	762	–	–	8 ± 0.4	51.8	89.5
800	869	875	–	–	8 ± 0.4	61.7	109
900	969	975	–	–	8 ± 0.4	68.3	123
1000	1071	1079	–	–	10 ± 0.4	74.0	148

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1. dimensions in mm and weights (contd.)

Nominal diameter acc. to ASME

ASME	External diameter d4 / sealing face: Plane. RF (raised faced)			L			E	Weight (approx. in kg)	
	Class 150	Class 300	Class 600	Class 150	Class 300	Class 600		Class 150 ... 600	With smallest nominal pressure
2 inch	105	111	111	79	79	79	2±0.2	2.5	4.5
2½ inch	124	130	130	96	96	96	2±0.2	3.4	6.4
3 inch	137	149	149	115	115	115	4±0.2	4.3	6.9
4 inch	175	181	194	137	137	137	4±0.2	4.7	8.6
5 inch	197	216	241	164	164	164	4±0.25	6.3	12.4
6 inch	222	251	267	193	193	193	4±0.29	7.0	17.0
8 inch	279	308	321	247	247	247	4±0.29	10.3	26.2
10 inch	340	362	400	302	302	302	4±0.32	13.1	36.6
12 inch	410	422	457	354	354	354	4±0.36	17.3	49.0
14 inch	451	486	492	403	403	403	4±0.4	25.0	63.0
16 inch	514	540	565	452	452	452	4±0.4	28.0	73.8
20 inch	549	597	613	553	563	563	6±0.4	36.2	65.9
24 inch	717	775	790	659	659	–	6±0.4	42.5	75.6

Orifice plates with annular chambers for installation between ASME flanges to ASME B16.5, dimensions in mm and weights

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1	Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1
for mounting between flanges					
Sealing faces to the mating flanges: plane.					
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
<u>Nominal diameter acc. to EN</u>					
DN 50			DN 350		
PN 6		1 GA	PN 6		2 HA
PN 10 ... PN 40		1 GE	PN 10		2 HB
PN 63		1 GF	PN 16		2 HC
PN 100		1 GG	PN 25		2 HD
DN 65			PN 40		2 HE
PN 6		1 HA	PN 63		2 HF
PN 10 ... PN 40		1 HE	PN 100		2 HG
PN 63		1 HF	DN 400		
PN 100		1 HG	PN 6		2 JA
DN 80			PN 10		2 JB
PN 6		1 JA	PN 16		2 JC
PN 10 ... PN 40		1 JE	PN 25		2 JD
PN 63		1 JF	PN 40		2 JE
PN 100		1 JG	PN 63		2 JF
DN 100			DN 500		
PN 6		2 AA	PN 6		2 KA
PN 10 and PN 16		2 AC	PN 10		2 KB
PN 25 and PN 40		2 AE	PN 16		2 KC
PN 63		2 AF	PN 25		2 KD
PN 100		2 AG	PN 40		2 KE
DN 125			DN 600		
PN 6		2 BA	PN 6		3 AA
PN 10 and PN 16		2 BC	PN 10		3 AB
PN 25 and PN 40		2 BE	PN 16		3 AC
PN 63		2 BF	PN 25		3 AD
PN 100		2 BG	DN 700		
DN 150			PN 6		3 BA
PN 6		2 CA	PN 10		3 BB
PN 10 and PN 16		2 CC	PN 16		3 BC
PN 25 and PN 40		2 CE	PN 25		3 BD
PN 63		2 CF	DN 800		
PN 100		2 CG	PN 6		3 CA
DN 200			PN 10		3 CB
PN 6		2 EA	PN 16		3 CC
PN 10 and PN 16		2 EC	PN 25		3 CD
PN 25		2 ED	DN 900		
PN 40		2 EE	PN 6		3 DA
PN 63		2 EF	PN 10		3 DB
PN 100		2 EG	PN 16		3 DC
DN 250			PN 25		3 DD
PN 6		2 FA	DN 1000		
PN 10		2 FB	PN 6		3 EA
PN 16		2 FC	PN 10		3 EB
PN 25		2 FD	PN 16		3 EC
PN 40		2 FE	PN 25		3 ED
PN 63		2 FF	<u>Nomin. diameter acc. to ASME</u>		
PN 100		2 FG	2 inch		
DN 300			Class 150		5 GA
PN 6		2 GA	Class 300		5 GB
PN 10		2 GB	Class 600		5 GC
PN 16		2 GC	2½ inch		
PN 25		2 GD	Class 150		5 HA
PN 40		2 GE	Class 300		5 HB
PN 63		2 GF	Class 600		5 HC
PN 100		2 GG	3 inch		
			Class 150		5 JA
			Class 300		5 JB
			Class 600		5 JC
			4 inch		
			Class 150		6 AA
			Class 300		6 AB
			Class 600		6 AC

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1	Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1
5 inch			Tapping sockets		
Class 150	6 BA		with threaded connection G $\frac{1}{2}$;		
Class 300	6 BB		for liquids and gases PN 160,		
Class 600	6 BC		for steam PN 100		
6 inch			• Opposite one another, straight	A	
Class 150	6 CA		• Opposite one another, bent-up, for vertical pipelines	B	
Class 300	6 CB		• Arranged on one side, for horizontal pipelines	C	
Class 600	6 CC		With threaded connection $\frac{1}{2}$ -14 NPT male		
8 inch			• Opposite one another, straight	Q	
Class 150	6 EA		• Opposite one another, bent-up, for vertical pipelines	R	
Class 300	6 EB		• Arranged on one side, for horizontal pipelines	S	
Class 600	6 EC		With pipe \varnothing 12 mm for pipe union with ferrule, max. 200 °C permissible		
10 inch			• Opposite one another, straight	J	
Class 150	6 FA		• Opposite one another, bent-up, for vertical pipelines	K	
Class 300	6 FB		• Arranged on one side, for horizontal pipelines	L	
Class 600	6 FC		With welding connection \varnothing 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100		
12 inch			• Opposite one another, straight	D	
Class 150	6 GA		• Opposite one another, bent-up, for vertical pipelines	E	
Class 300	6 GB		• Arranged on one side, for horizontal pipelines	F	
Class 600	6 GC		Shape of orifice disk aperture		
14 inch			For flow in one direction (see figure "Shapes of orifice disk aperture")		
Class 150	6 HA		• Orifice plate form A	A	
Class 300	6 HB		• Quarter-circle nozzle form B	B	
Class 600	6 HC		For flow in both directions		
16 inch			• Cylindrical orifice plate form D	D	
Class 150	6 JA		Manufactured according to pressure equipment directive		
Class 300	6 JB		None ¹⁾		0
Class 600	6 JC		According to Article 3, Paragraph 3		1
20 inch			Design data Y31 to Y35 necessary		
Class 150	6 KA		According to category 1, 2, 3 with CE marking and EC declaration of conformity		5
Class 300	6 KB		Design data Y31 to Y35 necessary		
Class 600	6 KC		¹⁾ Only possible outside Europe		
24 inch					
Class 150	7 AA				
Class 300	7 AB				
Class 600	7 AC				
Special version					
Specify Order code and plain text	9 AA 0 0	H 1 Y			
Nominal diameter: ..., nominal pressure: ..., material no.: ... and material name: ...					
Material for non-corrosive media					
Support rings made of P265GH, material no. 1.0425; tapping sockets made of P235GH, material no. 1.0345; orifice disk made of material no. 1.4404, permissible operating temperature -10 to +400 °C		1 2			
Material for corrosive media					
Support rings, tapping sockets and orifice disk made of X 2 CrNiMo 17-12-2, material No. 1.4404; permissible operating temp. -10 to +400 °C		1 5			

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

Selection and ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order code(s) and plain text.	
With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	Y21
With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	Y22
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture d = ... mm Internal diameter of pipe D=... mm Radius of quarter-circle nozzle r = ... mm	Y01
Design data according to Pressure equipment directive 97/23/EC	
Name of medium Specify in plain text: Medium: e. g. natural gas	Y31
Aggregate state Specify in plain text: Aggregate state: Liquid or gaseous	Y32
Fluid group Specify in plain text: Fluid group: Group 1: hazardous explosive fluid or Group 2: All other fluids	Y33
Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	Y34
Max. permissible temperature Specify in plain text: TS = ... in °C or °F	Y35
Orifice plate degreased for oxygen measurements	
• DN 50 (2") ... DN 150 (6")	A12
• DN 200 (8") ... DN 400 (16")	A13
• DN 500 (20") ... DN 1000 (40")	A14
Material certificate Acceptance test certificate to EN 10204-3.1	C01
Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	D11
Orifice disk including gasket	on request
Sealing face of orifice plate with recess or groove	on request

Note on ordering

The "calculation protocol" released by the customer with Order code Y21 or Y22 must be attached to the order as an appendix or the statement "orifice plate without calculation" will be made with Order code Y01.

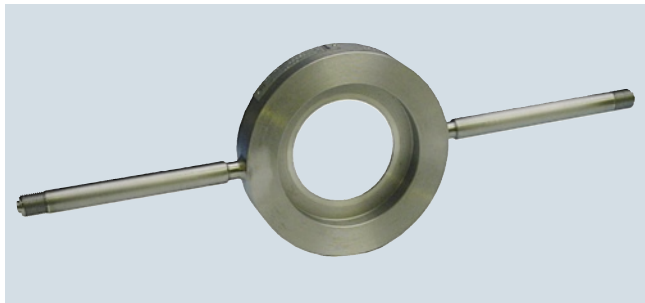
Scope of delivery

Two support rings with tapping sockets, one orifice disk, one gasket between orifice disk and support ring.
Graphite (99.85%) flat gasket with foil insert (1.4401, 0.1 mm). Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories

See "SITRANS P measuring instruments for pressure".

Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +570 °C.

Design

One-piece orifice plate, orifice disk form A, B or D (see types of primary differential pressure devices in "Technical description", "Function"); see Ordering data for materials.

Overall length

40 mm to DIN 19205

Nominal diameters

EN: DN 50 to DN 500

ASME: 2 inch to 20 inch

Nominal pressure

EN: PN 6 to PN 315

ASME: class 150 to 2500

Sealing face to the mating flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for versions to ASME

Tapping sockets

- With connection thread G $\frac{1}{2}$ DIN ISO 228/1, with connection dimensions to DIN 19207 form V
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version to ASME
- With \varnothing 12 mm pipe connection for pipe union with ferrule
- With welding connection, \varnothing 21.3 mm

Connection size

The connection size depends on the operating pressure, the temperature of the medium (DIN 19 207 and 19 211) and the medium, e. g.

- For liquids and gases,
 - up to PN 160: Thread G $\frac{1}{2}$ or welding connection \varnothing 21.3 mm
 - from PN 6 and PN 400: Welding connection \varnothing 21.3 mm
 - > PN 400: Welding connection \varnothing 24 mm
- For steam
 - up to PN 100: Thread G $\frac{1}{2}$ or welding connection \varnothing 21.3 mm
 - > PN 100: Welding connection \varnothing 24 mm

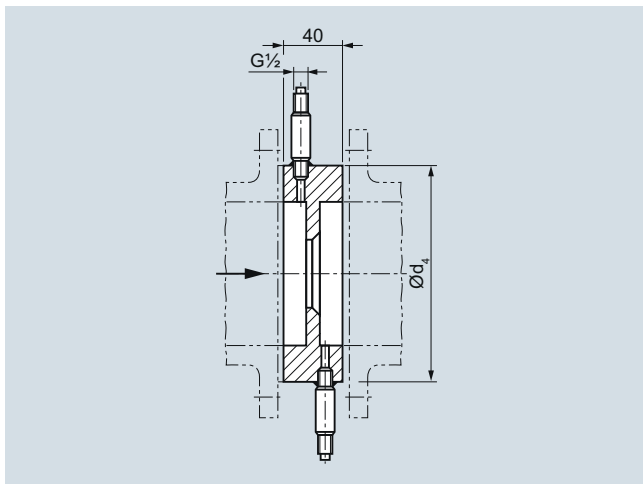
See "Technical description" and "Function" for position of the tapping sockets.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

Dimensional drawings



Tapping socket: Socket length is fixed in accordance with the pressure and nominal diameter (DIN 19 205, Part 2), dimensions in mm

- Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100,

Versions for steam lines: See "Technical description", "Function" for position of the tapping sockets.

Nominal diameter acc. to EN

DN	Inside diameter	External diameter d_4 / sealing face: plane, with recess or with groove.										Weight (approx. in kg)	
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 315	With smallest nominal pressure	With largest nominal pressure
50	45 ... 55	96	107	107	107	107	113	119	119	124	134	1.6	4.0
65	61 ... 71	116	127	127	127	127	138	144	144	154	170	2.2	6.3
80	77 ... 85	132	142	142	142	142	148	154	154	170	190	2.9	7.8
100	94 ... 108	152	162	162	168	168	174	180	180	202	229	3.2	11.5
125	117 ... 132	182	192	192	194	194	210	217	217	242	274	4.3	15.9
150	144 ... 160	207	218	218	224	224	247	257	257	284	311	4.7	20.6
200	188 ... 211	262	273	273	284	290	309	324	324	358	398	7.0	33.7
250	240 ... 262	317	328	329	340	352	364	391	388	442	488	9.0	50.6
300	292 ... 314	373	378	384	400	417	424	458	458	538	-	12.3	37.3
350	331 ... 362	423	438	444	457	474	486	512	-	-	-	17.7	44.6
400	383 ... 408	473	489	495	514	546	543	-	-	-	-	19.8	43.1
500	480 ... 514	578	594	617	624	628	-	-	-	-	-	25.6	46.6

Orifice plates with single tapplings for installation between EN flanges to EN 1092-1, dimensions in mm, weights

Nominal diameter acc. to ASME

ASME	External diameter d_4 / sealing face: plane, with recess or with groove.			Weight (approx. in kg)	
	Class 150	Class 300	Class 600	With smallest nominal pressure	With largest nominal pressure
2 inch	105	111	111	1.6	4.0
2½ inch	124	130	130	2.2	6.3
3 inch	137	149	149	2.9	7.8
4 inch	175	181	194	3.2	11.5
5 inch	197	216	241	4.3	15.9
6 inch	222	251	267	4.7	20.6
8 inch	279	308	321	7.0	33.7
10 inch	340	362	400	9.0	50.6
12 inch	410	422	457	12.3	37.3
14 inch	451	486	492	17.7	44.6
16 inch	514	540	565	19.8	43.1
20 inch	549	597	613	25.6	46.6

Orifice plates with single tapplings for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with single tap-pings	7 ME 1 1 2 0 -	- 1	Orifice plate with single tap-pings	7 ME 1 1 2 0 -	- 1
for mounting between flanges					
Sealing faces to the mating flanges: plane.					
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
<u>Nominal diameter acc. to EN</u>					
DN 50			DN 250		
PN 6		1 GA	PN 6		2 FA
PN 10 ... PN 40		1 GE	PN 10 and PN 16		2 FC
PN 63		1 GF	PN 25		2 FD
PN 100 and PN 160		1 GH	PN 40		2 FE
PN 250		1 GJ	PN 63		2 FF
PN 315		1 GK	PN 100 and PN 160		2 FH
DN 65			PN 250		2 FJ
PN 6		1 HA	PN 315		2 FK
PN 10 ... PN 40		1 HE	DN 300		
PN 63		1 HF	PN 6		2 GA
PN 100 and PN 160		1 HH	PN 10		2 GB
PN 250		1 HJ	PN 16		2 GC
PN 315		1 HK	PN 25		2 GD
DN 80			PN 40		2 GE
PN 6		1 JA	PN 63		2 GF
PN 10 ... PN 40		1 JE	PN 100 and PN 160		2 GH
PN 63		1 JF	DN 350		
PN 100 and PN 160		1 JH	PN 6		2 HA
PN 250		1 JJ	PN 10		2 HB
PN 315		1 JK	PN 16		2 HC
DN 100			PN 25		2 HD
PN 6		2 AA	PN 40		2 HE
PN 10 and PN 16		2 AC	PN 63		2 HF
PN 25 and PN 40		2 AE	PN 100		2 HG
PN 63		2 AF	DN 400		
PN 100 and PN 160		2 AH	PN 6		2 JA
PN 250		2 AJ	PN 10		2 JB
PN 315		2 AK	PN 16		2 JC
DN 125			PN 25		2 JD
PN 6		2 BA	PN 40		2 JE
PN 10 and PN 16		2 BC	PN 63		2 JF
PN 25 and PN 40		2 BE	DN 500		
PN 63		2 BF	PN 6		2 KA
PN 100 and PN 160		2 BH	PN 10		2 KB
PN 250		2 BJ	PN 16		2 KC
PN 315		2 BK	PN 25		2 KD
DN 150			PN 40		2 KE
PN 6		2 CA	<u>Nominal diameter acc. to ASME</u>		
PN 10 and PN 16		2 CC	2 inch		
PN 25 and PN 40		2 CE	Class 150		5 GA
PN 63		2 CF	Class 300		5 GB
PN 100 and PN 160		2 CH	Class 600		5 GC
PN 250		2 CJ	2½ inch		
PN 315		2 CK	Class 150		5 HA
DN 200			Class 300		5 HB
PN 6		2 EA	Class 600		5 HC
PN 10 and PN 16		2 EC	3 inch		
PN 25		2 ED	Class 150		5 JA
PN 40		2 EE	Class 300		5 JB
PN 63		2 EF	Class 600		5 JC
PN 100 and PN 160		2 EH	4 inch		
PN 250		2 EJ	Class 150		6 AA
PN 315		2 EK	Class 300		6 AB
			Class 600		6 AC
			5 inch		
			Class 150		6 BA
			Class 300		6 BB
			Class 600		6 BC

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with single tap-pings	7 ME 1 1 2 0 -	- 1	Orifice plate with single tap-pings	7 ME 1 1 2 0 -	- 1
6 inch			Tapping sockets		
Class 150	6 CA		with threaded connection G $\frac{1}{2}$; for liquids and gases PN 160, for steam PN 100		A
Class 300	6 CB		• Opposite one another, straight		B
Class 600	6 CC		• Opposite one another, bent- up, for vertical pipelines		G
8 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		
Class 150	6 EA		With threaded connection $\frac{1}{2}$ -14 NPT male		Q
Class 300	6 EB		• Opposite one another, straight		R
Class 600	6 EC		• Opposite one another, bent- up, for vertical pipelines		T
10 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		
Class 150	6 FA		With pipe \varnothing 12 mm for pipe union with ferrule, max. 200 °C permissible		J
Class 300	6 FB		• Opposite one another, straight		K
Class 600	6 FC		• Opposite one another, bent- up, for vertical pipelines		M
12 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		
Class 150	6 GA		With welding connection \varnothing 21.3 mm; for liquids and gases PN 100 ... 400, for steam PN 100 or \varnothing 24 mm; for liquids and gases over PN 400, for steam over PN 100		D
Class 300	6 GB		• Opposite one another, straight		E
Class 600	6 GC		• Opposite one another, bent- up, for vertical pipelines		H
14 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		
Class 150	6 HA		Shape of orifice disk aper- ture		
Class 300	6 HB		(see figure "Shapes of orifice disk aperture")		
Class 600	6 HC		For flow in one direction		A
16 inch			• Orifice plate form A		B
Class 150	6 JA		• Quarter-circle nozzle form B		
Class 300	6 JB		For flow in both directions		D
Class 600	6 JC		• Cylindrical orifice plate form D		
20 inch			Manufactured according to pressure equipment directive		
Class 150	6 KA		None ¹⁾		0
Class 300	6 KB		According to Article 3, Para- graph 3		1
Class 600	6 KC		Design data Y31 to Y35 neces- sary		
Special version			According to category 1, 2, 3 with CE marking and EC dec- laration of conformity Design data Y31 to Y35 neces- sary.		5
Specify Order code and plain text	9 AA 0 0	H 1 Y			
Nominal diameter: ..., nominal pressure: ... material no.: ... and material name: ...					
Material for corrosive media					
Orifice plate and tapping socket made of X 2 CrNiMo 17-12-2, material no. 1.4404; permissible operating temp. -10 to +400 °C		2 3			
Material for non-corrosive media					
Orifice plate and tapping socket made of 13 CrMo 4-5, material no. 1.7335; permissible operating temp. -10 to +570, high temperature		2 4			
Orifice plate made of P265GH, material no. 1.0425; tapping sockets made of P235GHTC2, material no. 1.0345; metering edge with X 15 CrNiMn 18-8, material no. 1.4370, deposition welded; permissible operating temper- ature -10 to +400 °C		2 5			

¹⁾ Only possible outside Europe.

Selection and ordering data	Order code
Further designs Add "-Z" to Article No. and specify Order code(s) and plain text.	
With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	Y21
With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	Y22
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture $d = \dots$ mm Internal diameter of pipe $D = \dots$ mm Radius of quarter-circle nozzle $r = \dots$ mm	Y01
Angle between the tapping sockets Specify in plain text: Angle between the tapping sockets ...°	Y02
Design data according to Pressure equipment directive 97/23/EC	
Name of medium Specify in plain text: Medium: e. g. natural gas	Y31
Aggregate state Specify in plain text: Aggregate state: Liquid or gaseous	Y32
Fluid group Specify in plain text: Fluid group: Group 1: hazardous explosive fluid or Group 2: All other fluids	Y33
Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	Y34
Max. permissible temperature Specify in plain text: TS = ... in °C or °F	Y35
Orifice plate degreased for oxygen measurements	
• DN 50 (2") ... DN 150 (6")	A12
• DN 200 (8") ... DN 400 (16")	A13
• DN 500 (20") ... DN 1000 (40")	A14
Material certificate Acceptance test certificate to EN 10204-3.1	C01
Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	D11
Overall length 65 mm (required for tapping sockets arranged on one side)	on request
Orifice disk including gasket	on request
Sealing face of orifice plate with recess or groove	on request

Note on ordering

The "calculation protocol" released by the customer with Order code Y21 or Y22 must be attached to the order as an appendix or the statement "orifice plate without calculation" will be made with Order code Y01.

Scope of delivery:

One-part orifice plate with tapping sockets

Accessories:

See "SITRANS P measuring instruments for pressure".

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Metering pipe with orifice plate and annular chamber

Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +400 °C.

Design

Orifice plate with annular chambers consisting of two support rings with replaceable orifice disk form A or B (see types of primary differential pressure devices in "Technical description", "Function"); flanged between inlet and outlet pipe sections with lengths according to DIN 19205.

Nominal diameters

- EN: DN 10 to DN 50
- ASME: ½ inch to 2 inch

Nominal pressure

- EN: PN 10 to PN 100
- ASME: class 150 to 600

Sealing face of the end flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for versions to ASME

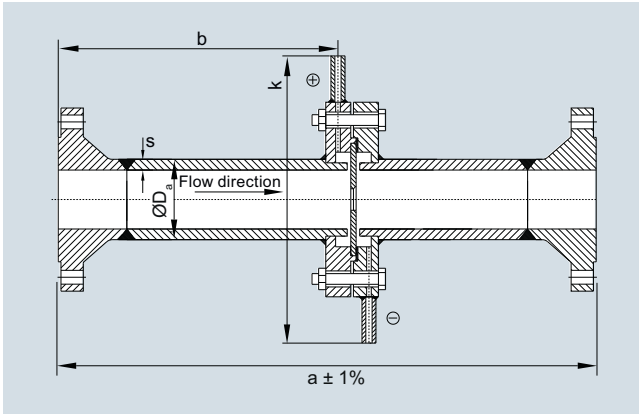
Tapping sockets

(For the dimensions of the following tapping sockets, see page 3/421)

- With connection thread G½ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection ½-14 NPT male, for version to ASME
- With Ø 12 mm pipe connection for pipe union with ferrule
- With welding connection, Ø 21.3 mm

For length of tapping sockets for all metering pipe $L = 120$ mm and position of tapping socket, see "Technical Description" and "Function".

Dimensional drawings



Nominal diameter acc. to EN

DN	PN	a	L	k	Pipe ¹⁾ D _a x s	Weight (approx. kg)
10	10 and 16	400	218	320	16 x 3	4.5
	25 and 40			320		5
	63 and 100			295		6.5
15	10 and 16	550	368	325	20 x 2.5	5
	25 and 40			325		5.5
	63 and 100			300		7.5
20	10 and 16	700	488	335	25 x 2.5	6.5
	25 and 40					7
25	10 and 16	900	638	310	30 x 2.5	8
	25 and 40					9
	63 and 100					14
32	10 and 16	1100	788	320	38 x 3	11.5
	25 and 40					12.5
40	10 and 16	1300	988	330	48.3 x 3.6 oder 50 x 5	13
	25 and 40			330		15
	63 and 100			335		25
50	10 and 16	1500	1188	340	60 x 5	20
	25 and 40			340		22
	63			345		34
	100			345		34

Metering pipes with orifice plates and annular chambers for installation between EN flanges to EN 1092.1, dimensions in mm and weights

¹⁾ The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Nominal diameter acc. to ASME

ASME	PN	a	L	k	Pipe ¹⁾ D _a x s	Weight (approx. kg)
½ inch	Class 150	550	368	297	20 x 2.5	5
	Class 300			307		5.5
	Class 600			307		7.5
¾ inch	Class 150	700	488	297	25 x 2.5	6.5
	Class 300			307		7
	Class 600			307		8
1 inch	Class 150	900	638	307	30 x 2.5	8
	Class 300			313		9
	Class 600			313		14
1¼ inch	Class 150	1100	788	316	38 x 3	11.5
	Class 300			322		12.5
	Class 600			322		14
1½ inch	Class 150	1300	988	326	48.3 x 3.6 or 50 x 5	13
	Class 300			335		15
	Class 600			335		25
2 inch	Class 150	1500	1188	345	60 x 5	20
	Class 300			371		22
	Class 600			351		34

Metering pipes with orifice plates and annular chambers for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights



¹⁾ The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Metering pipe with orifice plate and annular chamber

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Metering pipe for mounting between flanges for non-corrosive media Orifice plate with annular chambers mounted between flanges Sealing faces to the mating flanges: plane ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7 ME 1 3 1 0 -	- 1	Metering pipe for mounting between flanges for non-corrosive media 1½ inch • Class 150 • Class 300 • Class 600 2 inch • Class 150 • Class 300 • Class 600 Special version Specify Order code and plain text Nominal diameter: ..., nominal pressure: ... material no.: ... and material name: ...	7 ME 1 3 1 0 -	- 1
Nominal diameter acc. to EN DN 10 • PN 10 and PN 16 • PN 25 and PN 40 • PN 63 • PN 100 DN 15 • PN 10 and PN 16 • PN 25 and PN 40 • PN 63 • PN 100 DN 20 • PN 10 and PN 16 • PN 25 and PN 40 DN 25 • PN 10 and PN 16 • PN 25 and PN 40 • PN 63 • PN 100 DN 32 • PN 10 and PN 16 • PN 25 and PN 40 DN 40 • PN 10 and PN 16 • PN 25 and PN 40 • PN 63 • PN 100 DN 50 • PN 10 and PN 16 • PN 25 and PN 40 • PN 63 • PN 100		1 AC 1 AE 1 AF 1 AG 1 BC 1 BE 1 BF 1 BG 1 CC 1 CE 1 DC 1 DE 1 DF 1 DG 1 EC 1 EE 1 FC 1 FE 1 FF 1 FG 1 GC 1 GE 1 GF 1 GG	Material for non-corrosive media Orifice disk made of material no. 1.4404; support ring and flange made of material no. 1.0460, pipes and tapping sockets made of material number 1.0345; permissible operating temperature -10 to +400 °C Material for corrosive media Orifice disk, support rings, pipes and flange made of material no. 1.4404; permissible operating temperature -10 to +400 °C Tapping sockets with threaded connection G½; for liquids and gases PN 160, for steam PN 100 • Opposite one another, straight • Opposite one another, bent-up, for vertical pipelines • Arranged on one side, for horizontal pipelines With threaded connection ½-14 NPT male; for liquids and gases PN 160, for steam PN 100 • Opposite one another, straight • Opposite one another, bent-up, for vertical pipelines • Arranged on one side, for horizontal pipelines With pipe Ø 12 mm for pipe union with ferrule, max. 200 °C permissible • Opposite one another, straight • Opposite one another, bent-up, for vertical pipelines • Arranged on one side, for horizontal pipelines With welding connection Ø 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100 • Opposite one another, straight • Opposite one another, bent-up, for vertical pipelines • Arranged on one side, for horizontal pipelines		5 FA 5 FB 5 FC 5 GA 5 GB 5 GC 9 AA 00 H 1 Y 3 2 3 4 A B C Q R S J K L D E F
Nominal diameter acc. to ASME ½ inch • Class 150 • Class 300 • Class 600 ¾ inch • Class 150 • Class 300 • Class 600 1 inch • Class 150 • Class 300 • Class 600 1¼ inch • Class 150 • Class 300 • Class 600		5 BA 5 BB 5 BC 5 CA 5 CB 5 CC 5 DA 5 DB 5 DC 5 EA 5 EB 5 EC			

Selection and ordering data	Article No.	Order code	Selection and ordering data	Order code
Metering pipe for mounting between flanges for non-corrosive media	7 ME 1 3 1 0 -  - 1 		Further designs Add "-Z" to Article No. and specify Order code(s) and plain text.	
Shape of orifice disk aperture For flow in one direction (see figure "Shapes of orifice disk aperture") • Orifice plate form A • Quarter-circle nozzle form B For flow in both directions • Cylindrical orifice plate form D		A B D	With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	Y21
Manufactured according to pressure equipment directive None ¹⁾ According to Article 3, Paragraph 3 Design data Y31 to Y35 necessary According to category 1, 2 with CE marking and EC declaration of conformity Design data Y31 to Y35 necessary		0 1 5	With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	Y22
			Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture d = ... mm Internal diameter of pipe D =... mm Radius of quarter-circle nozzle r = ... mm	Y01
			Design data according to Pressure equipment directive 97/23/EC	
			Name of medium Specify in plain text: Medium: e. g. natural gas	Y31
			Aggregate state Specify in plain text: Aggregate state: Liquid or gaseous	Y32
			Fluid group Specify in plain text: Fluid group: Group 1: hazardous explosive fluid or Group 2: All other fluids	Y33
			Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	Y34
			Max. permissible temperature Specify in plain text: TS = ... in °C or °F	Y35
			Orifice plate degreased for oxygen measurements • DN 10 (1/2") ... DN 50 (2")	A12
			Material certificate Acceptance test certificate to EN 10204-3.1	C02
			Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	D11

Note on ordering

The "calculation protocol" released by the customer with Order code Y21 or Y22 must be attached to the order as an attachment or the statement "orifice plate without calculation" will be made with Order code Y01.

Scope of delivery:

Orifice plate, comprising two support rings with tapping sockets and one orifice disk, with gaskets between orifice disk and support ring, including screws and bolts.
Graphite (99.85%) flat gasket with foil insert (1.4401, 0.1 mm).
Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories:

See "SITRANS P measuring instruments for pressure".

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Calculation of primary devices

Overview

Note on calculation order and product ordering:

Before an orifice plate is ordered, the calculation of the orifice plate must be completed with a calculation protocol.

The calculation protocol issued by the customer is then included in the order for the orifice plate as an attachment.

When ordering the "Primary differential pressure device calculation" service, a completed questionnaire must be enclosed.

This online questionnaire can be found in the PIA Life Cycle Portal at www.siemens.com/pia-portal.

All the data required for the calculation are requested menu-driven and can be verified by a check function.

If the data entered in the questionnaire are incomplete, an extra charge will be made for the additional clarification and calculations required.

Selection and ordering data	Article No.
Calculation of orifice disk aperture an orifice plate, ISA-1932 nozzle, Venturi nozzle, Venturi tube and other primary differential pressure devices (without measuring sheet or sketch)	7ME1910-0A
Calculation of differential pressure or flow on an existing primary device	7ME1910-0D
<i>Further designs</i> Add "-Z" to Article No. and specify Order code(s) and plain text.	Order code
SITRANS F O - questionnaire online The completed online questionnaire should be attached to the order! (see Online Questionnaire in the PIA Life Cycle Portal)	Y02

Overview

Mechanical registers, automatic batchmeters and digital registers with current and pulse output

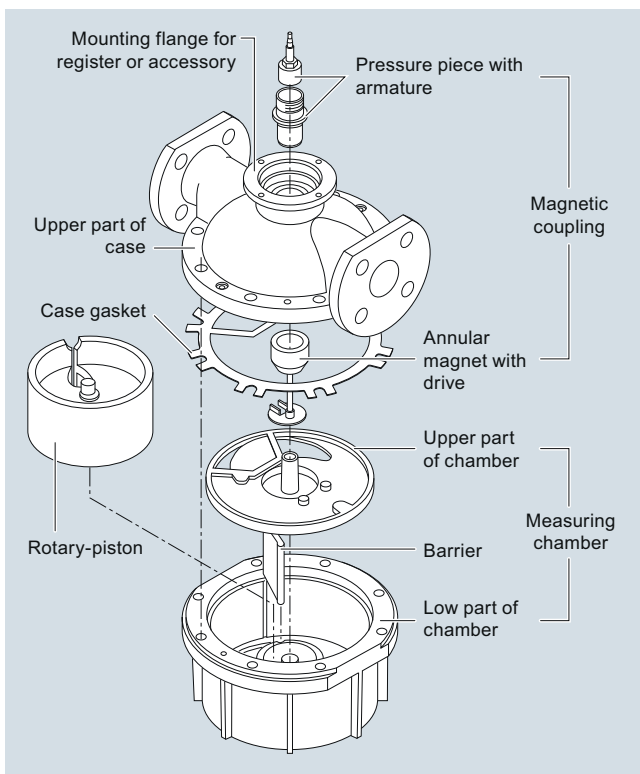
Rotary-piston meter DN 25 (1") with single-pointer dial type 01

Rotary piston meter with electric flow register in compact form

Rotary-piston meter DN 50 (2") with mech. single-pointer dial type 01, with accessories (here: cooling attachment and pulser)

Automatic batch meter DN 50 (2"), with rotary-piston meter, quantity preset register and shut-off valve

Design



Metering mechanism of a rotary-piston meter DN 25/PN 10 (1"/MWP 145 psi) (industrial model)

The measuring chamber is inserted into the case for the rated pressure classes PN 25, PN 40 and PN 63 (MWP 363, 580 and 914 psi). The meters for rated pressures PN 4, PN 6 and PN 10 (MWP 58, 87 and 145 psi) have a measuring chamber machined to the lower part of the case.

All components of the meters are made of wear-resistant materials. Several materials are available for the parts which come into contact with the metered liquid (see Selection and Ordering data). The most suitable combination can be selected taking into account the corrosion resistance with respect to the liquid to be measured as well as the running characteristics and the permissible temperatures.

Benefits

- High measuring accuracy (approved for custody transfer)
- Suitable for flow rates up to 1000 l/min (264 USgpm)
- Wide flow rate range
- Low dependence on viscosity
- Low pressure drop
- Simple compact design
- High reliability
- Advantages with extremely high viscosity since pressure drops up to 3 bar (43.5 psi) permissible
- Advantages with very low viscosity (e.g. liquefied gas) since only low pressure drops occur because of the light-weight mechanism with good running characteristics
- Wide range of available materials, e.g. plastic lining for particularly corrosive liquids
- Easy service as a result of simple design
- Liquid temperatures up to 300 °C
- Also available with external heater
- Metering and dispensing without a power supply
- No inlet or outlet pipe sections required
- Independent of flow profile, conductivity and damping

Rotary-piston meters are characterized by:

- Accuracy
- Reliability
- Robust design

Flow Measurement

SITRANS F R

Rotary-piston meters and automatic batchmeters - Introduction

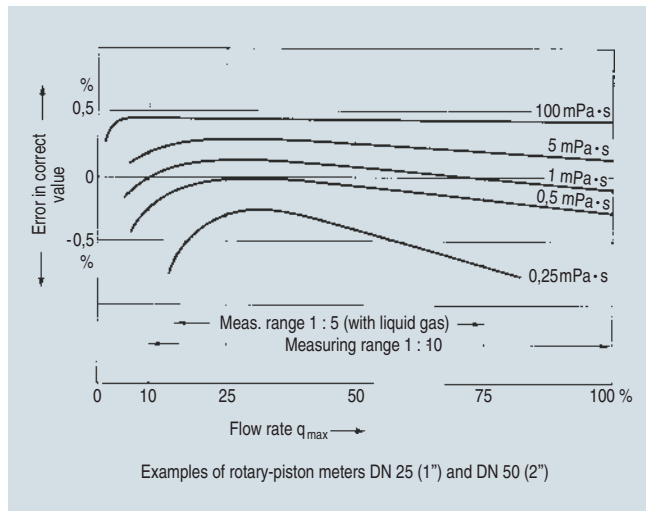
Configuration

Error curves of rotary-piston meters

The shape of the error curve is also affected by the viscosity of the metered liquid. The error in measurement increases with decreasing viscosity, especially at the beginning and towards the end of the flow rate range.

By appropriate regulation, i.e. changing a pair of gear-wheels between the meter mechanism and the register, the position of the error curve can be displaced parallel to the zero line and thus the meter can be optimally calibrated. The appropriate pair of replacement gears can be read off from a table or determined with the aid of a calculating disk.

The illustration "Error curves of volumetric meters" shows error curves without any regulation having been carried out.



Error curves of volumetric meters dependent in shape and location on the flow rate and the viscosity of the liquid

Note: 1 mPa·s = 1 cp

Measuring accuracy

The rotary-piston meters are approved in the European Community and in many other countries for the custody transfer.

The following error limits apply between 0.2 % and 0.5 % of the correct value (depending on the liquid, the measuring range and the relevant calibration specifications).

The stated error limits in % of the correct value apply to the whole flow rate and for any delivery quantity greater than the smallest permissible quantity.

This is an important difference compared to other measuring instruments whose errors are related to the full-scale value and thus only reach the stated accuracy at one point - full-scale deflection. The minimum flow rate should not fall below 10% of the maximum flow rate in order to remain within the stated accuracy limit. This explains why the usual flow rate range for volumetric meters is 1:10.

Note: The measuring system of the rotary-piston meter must always be filled with the liquid to be measured in order to achieve a high measuring accuracy.

Note

The material combinations which can be supplied are listed in the Selection and Ordering data. The maximum permissible liquid temperature is determined by the "weakest link" in the particular combination (the PCTFE rotary-piston, for example, in a meter made of Cranium steel).

Service life (long-term accuracy)

The service life of a volumetric meter, i.e. the operating time until an overhaul or recalibration becomes necessary, is determined by the mechanical abrasion of the moving parts of the mechanisms which occurs because of forces from the metered liquid.

As well as the nature of the materials used (running characteristics), the service life is dependent on the lubricating properties of the metered liquid, the service is dependent on the lubricating properties of the metered liquid, the daily operating time and the cube of the flow rate (speed of rotation). The last factor is one of the reasons why only half of the maximum flow rate specified for the batch operation is permissible for continuous operation.

Since the above factors can hardly be determined exactly with industrial use of the meter, unequivocal statements on the service life (long-term accuracy) are not possible.

Recalibration is required every two years by law (in Germany) for meters used for custody transfer. On the basis of this regulation, it is recommended that meters which are not used for custody transfer be checked and recalibrated if necessary, at intervals of two to three years. Even this recommendation is based on average, "normal" operating conditions. A period of three years is too short, for example, for a meter used for the batch dispensing of lubricating oil, it will still work within the stated error limits even after five years or more.

Further technical specifications

Materials and max. permissible liquid temperatures

Housing (also lining with acid resistant meters) and measuring chamber

Temperature range

- Cast iron, spheroidal graphite, cast steel, Cranium steel

-30 ... +300 °C (-22 ... +572 °F)

General data

Error limits

Between 0.2 % and 0.5 % of the correct value (depending on the metered fluid, the measuring range and the relevant calibration regulations) except for rotary-piston meters DN 15 (½") and acid-resistant meters with PCTFE pistons; where 1% of the actual value applies.

Reproducibility

Within 0.05 %

Adjustment

In steps from 0.01 %

Pressure drop

Max. permissible 3 bar (43.5 psi), max. 0.5 bar (7.25 psi) for acid resistant meters

Transmission from wet to dry space

Gland-free, via permanent magnet coupling

Installation position (axis of meter mechanism)

- Rotary-piston meter for industrial use

Vertical

- Special designs

- Rotary-piston meter for oil fuels

Any

- Rotary-piston meter for liquid gas

Meter axis vertical

Special inlet and outlet pipe sections

Not necessary

Pipe connection

Flanges drilled to DIN 2501, DIN 2547 (PN 63 only)

Filter size (mesh width)

0.8 mm (0.031 inch) for rotary-piston meter

Selection overview, rotary piston meters










Version	Rotary piston meters			
Nominal diameter	DN 15	DN 25	DN 50	DN 80
Article No.	7MR10...-...	7MR11...-...	7MR14...-...	7MR16...-...
Nominal pressure				
PN 6			•	
PN 10		•		
PN 16		•	•	
PN 25	•	•	•	•
PN 40		•	•	•
PN 63		•	•	
Flow variables				
Max. 20 l/min	•			
Max. 100 l/min		•		
Max. 500 l/min			•	
Max. 1 000 l/min				•
Flange standards				
Drilled acc. to EN	•	•	•	•
Drilled acc. to ASME	•	•	•	•
With raised faces	•	•	•	•
Approvals				
Custody transfer		•	•	•
Material acceptance test EN 10204-3.1	•	•	•	•
ATEX		in preparation		
Piston material				
Carbon	•	•	•	•
Cast iron	•	•	•	•
Ni-resist		•	•	•
Hard rubber	•	•	•	•
PTFE 40 °C		•	•	•
PTFE 90 °C		•	•	•
CrNiMo steel with carbon contact surface		•		
CrNiMo steel with PTFE contact surface		•		
PCTFE	•	•	•	
Designs				
Mechanical single-pointer dial	•	•	•	•
Mechanical double-pointer dial	•	•	•	•
As automatic batchmeter (incl. shut-off valve)		•	•	
With electronic flow register	•	•	•	•
Remote or compact installation	•	•	•	•

Flow Measurement

SITRANS F R

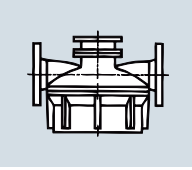
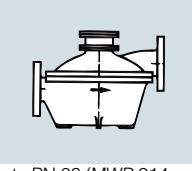
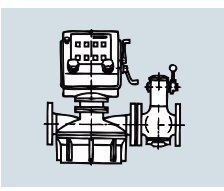
Rotary-piston meters and automatic batchmeters - Introduction

Rotary piston meters - Configurations

	Mechanical display			Digital displays	
	Compact design			As separate model	Compact design
	Without pulse and current output	With pulse and current output		With pulse and current output Incl. protective cover	With pulse and current output Incl. mounting bracket
Registers					
Single-pointer dial type 01	•	•	•		
Double-pointer dial type 11 und 12	•	•	•		
Quantity preset register	•	•	•		
					
SITRANS F RA110 electric flow registers (7MV1070-...)					
• Without mounting bracket				•	
• With mounting bracket					•
					
Pulser					
10 pulses/revolution				•	•
100 pulses/revolution					
10 pulses/value per revolution		•			
100 pulses/value per revolution					
					
Intermediate gear					
(Part of Article No. of the rotary piston meter)	•	•	•		
					
Pulser					
10 Impulse/measuring chamber volumes			•		
100 Impulse/measuring chamber volumes					
(Selection with data position 14 of Article No. of the rotary piston meter)					
					
Cooling attachment					
Up to 80 °C: none (Article No. 7MR1...-.....)	•	•	•	•	•
Up to 180 °C: one (Article No. 7MR1...-.....+7MV3001-1xx00)					
Up to 260 °C: two (Article No. 7MR1...-.....+7MV3001-2xx00)					
					
Rotary piston meters and automatic batchmeters					
Rotary piston meters	•	•	•	•	•
DN 15 7MR10...-.....					
DN 25 7MR11...-.....					
DN 50 7MR14...-.....					
DN 80 7MR16...-.....					
Automatic batchmeters					
DN 25 7MR111...-.....					
DN 50 7MR141...-.....					
					
			Measuring chamber volumes: DN 15 (1/2") 0.033 l (0.0087 USgpm) DN 25 (1") 0.179 l (0.0473 USgpm) DN 50 (2") 1.5 l (0.317 USgpm) DN 80 (3") 4.32 l (1.14 USgpm)		

Technical specifications

Meter sizes (DN), pressure stages (PN) and permissible flow rates (q) for rotary-piston meters and automatic batchmeters

Design	DN		PN		Rated flow rate		Permissible flow rate						
	mm	(inch)	bar	(psi)	l/min	(USgpm)	With viscosity ⁸⁾	Min. ¹⁾ with continuous ²⁾ operation	Max. with intermittent ³⁾⁴⁾ operation	Max. with continuous operation	l/min	(USgpm)	
Rotary-piston meter for industrial use													
	15 ⁵⁾	(½) ⁵⁾	25	(363)	20	(5.3)	≤ 1	1.5	10 ⁶⁾	(5.3)	10	(2.6)	
							< 5	1.0	20	(5.3)	10	(2.6)	
							800	0.2	20	(5.3)	10	(2.6)	
							2 000	0.2	10	(1.3)	5	(1.3)	
up to PN 16 (MWP 232 psi)	25	(1)	10	(145)	100	(26.4)	0.3	12	(3.2)	100	(26)	80	(13)
			16	(232)			0.6	6	(1.6)	100	(26)	80	(13)
			25	(363)			1	5	(1.3)	100	(26)	80	(13)
			40	(580)			5	3	(0.8)	100	(26)	80	(13)
			63	(914)			800	1	(0.26)	100	(26)	80	(13)
	50	(2)	6	(87)	500	(132)	0.3	40	(11)	500	(106)	350	(44)
			16	(232)			0.6	20	(5.3)	500	(132)	350	(44)
			25	(363)			1	18	(4.8)	500	(132)	350	(44)
			40	(580)			5	10	(2.6)	500	(132)	350	(44)
			63	(914)			800	2	(0.53)	500	(106)	350	(44)
up to PN 63 (MWP 914 psi)	80	(3)	25	(363)	1 000	(264)	0.3	60	(16)	1 000	(211)	700	(93)
			40	(580)			0.6	35	(9.3)	1 000	(264)	700	(93)
							1	25	(6.6)	1 000	(264)	700	(93)
							5	10	(2.6)	1 000	(264)	700	(93)
							800	5	(1.3)	1 000	(211)	500	(93)
Automatic batchmeter (Rotary-piston meter with quantity preset register and mechanical shut-off valve)													
	25	(1)	10	(145)	100	(26.4)	0.3	12	(3.2)	100	(26)	–	–
							0.6	6	(1.6)	100	(26)	–	–
							1	5	(1.3)	100	(26)	–	–
							5	3	(0.8)	100	(26)	–	–
							800 ⁷⁾	1	(0.26)	100	(26)	–	–
	50	(2)	6	(87)	500	132	0.3	40	(11)	500	(106)	–	–
							0.6	20	(5.3)	500	(132)	–	–
							1	18	(4.8)	500	(132)	–	–
							5	10	(2.6)	500	(132)	–	–
							800 ⁷⁾	2	(0.53)	400	(106)	–	–

1) For metal rotary-pistons: increase by a factor of 2, for PCTFE and PTFE/graphite filling rotary-pistons: increase by a factor of 3.

2) Continuous operation: over 8 hours a day.

3) For metal pistons: reduce by a factor ≈0.8 to extend service life.

4) Intermittent operation: up to 8 hours a day

5) Note: When using pistons made of carbon, there is danger of break in the case of liquid hammers

6) When using pistons made of carbon.

7) Max. permissible viscosity for exact closing of the shut-off valve and for exact dispensing: viscosities up to 4 000 mPa·s (cp) possible.

8) Higher viscosity on request.

Note:

In order to extend the service life of the pulse sensor, rotary-piston meters with current and/or pulse output (without intermediate gear) should only be operated at max. 60 % of the permissible flow.

Piston materials

Piston material	Design	Permissible liquid temperature (°C/°F)	Max. perm. dyn. viscosity mPa·s (cp)	Article No. code
Carbon		-10 ... 300/ 14 ... 572	25	K
Cast iron (mat. No. GG 25)	with slotting	-10 ... 300/ 14 ... 572		E
Cast iron (mat. No. GG 25)		-10 ... 300/ 14 ... 572		B
Ni-Resist (mat. No. 0.6660)	with slotting	-10 ... 300/ 14 ... 572		N
Ni-Resist (mat. No. 0.6660)		-10 ... 300/ 14 ... 572		C
Hard rubber	with slotting	-10 ... 40 ¹⁾ / 14 ... 104 ¹⁾	50	G
Hard rubber		-10 ... 40 ¹⁾ / 14 ... 104 ¹⁾	50	D
PTFE/graphite filling	with slotting	0 ... 40 ²⁾ / 32 ... 104 ²⁾	120	F
PTFE/ graphite filling		0 ... 40 ²⁾ / 32 ... 104 ²⁾	120	L
PTFE/ graphite filling	with slotting	0 ... 90 ²⁾ / 32 ... 194 ²⁾	120	R
PTFE/ graphite filling		0 ... 90 ²⁾ / 32 ... 194 ²⁾	120	M
PCTFE	with slotting	-10 ... +40 ²⁾ / 14 ... 104 ²⁾	120	H
PCTFE		-10 ... +40 ²⁾ / 14 ... 104 ²⁾	120	J
CrNi steel with carbon contact surface (DN 25 (1") only)	Collar piston	-10 ... +200/ 14 ... 392	> 10	S
CrNi steel with PTFE contact surface (DN 25 (1") only)		-10 ... +40/ 14 ... 104	> 10	T

1) For 120 min max. 65 °C (149 °F); for 20 min max. 90 °C (194 °F), e. g. for cleaning procedures

2) Error limit max. 1%; at 90°C (194 °F) max. 2%

Flow Measurement

SITRANS F R

Rotary-piston meters – Ordering data - DN 15 (1/2"), rated flow rate 20 l/min (5.3 USgpm)

Selection and Ordering data							Article No.	Order code
Rotary-piston meter DN 15 (1/2")								
Nom. press.	Materials		Casing gasket		Can be heated using 2 thread connections	Weight appr. kg (lb)		
	Housing	Meas. chamber	Rotary piston					
PN 25 (363 psi)	Cast iron	Cast iron	• •	Flat gasket	R 3/4"	9.0 (19.8)	7MR1020 - E	
	CrNiMo steel	CrNiMo steel	• • •	AFM 34	no	9.0 (19.8)	7MR1020 - S	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.								
Rotary piston material								
					Max. permissible liquid temperature			
Carbon			•		300 °C (572 °F)		K	
Cast iron				•	300 °C (572 °F)		E	
Hard rubber				•	40 °C (104 °F)		G	
PCTFE				•	40 °C (104 °F)		H	
Flow direction								
Mechanism shaft vertical	From left to right						1	
	From right to left						2	
	From front to back						3	
	From back to front						4	
Mechanism shaft horizontal	From left to right						5	
	From right to left						6	
	Upwards						7	
	Downwards						0	
Mechanical registers¹⁾								
Single-pointer dial								
• Type 01								0 1
Double-pointer dial								
• Type 11, vertical mounting								1 1
• Type 12, horizontal mounting								1 2
Value per								
• 1 l (0.26 USg)								1
Fastest pointer or fastest drum								
Accessories (pulsers, cooling attachments)¹⁾								
• None								A
• Mounted								B
• Pulsar already mounted <u>above</u> the intermediate gear:								
- 10 pulses/value per revolution								C
- 100 pulses/value per revolution								D
• Pulsar already mounted <u>below</u> the intermediate gear:								
- 10 pulses/measuring chamber volume								G
- 100 pulses/measuring chamber volume								H

For Selection and Ordering data of „Digital register with current and pulse output“, „Tests“ und „Flanges“ see page 3/454.
Heating systems on request.

¹⁾ For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
 For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

Rotary-piston meters – Ordering data - DN 25 (1"), rated flow rate 100 l/min (26.5 USgpm)

3

Selection and Ordering data										Article No.	Order code				
Rotary-piston meter DN 25 (1")															
Nom. press.	Materials		Rotary piston					Casing gasket	Weight appr. kg (lb)						
	Housing	Meas. chamber													
PN 10 (145 psi)	Cast iron	Cast iron			•	•	•	•	•	Flat gasket AFM 34	10.5 (23.2)	7MR1110 - E			
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	•	•	•	•						7MR1110 - S			
PN 25 (363 psi)	Cast iron	Cast iron			•	•	•	•	•		20 (44.1)	7MR1120 - E			
PN 40 (580 psi)	Cast steel	Cast iron			•	•	•	•	•	FKM (O-ring)	24 (52.9)	7MR1130 - E			
PN 63 (914 psi)	Cast steel	Cast iron			•	•	•	•	•	Flat gasket AFM 34	30 (66.1)	7MR1140 - E			
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.															
Rotary piston material										Max. permissible liquid temperature	Weight appr. kg (lb)				
Carbon									•		0.15 (0.33)	K			
Cast iron									•		0.55 (1.21)	E			
Cast iron, grooved									•		0.5 (1.1)	B			
Ni-resist									•		0.55 (1.21)	N			
Ni-resist, grooved									•		0.5 (1.1)	C			
Hard rubber								•		40 °C (104 °F)	0.1 (0.2)	G			
Hard rubber, grooved								•		40 °C (104 °F)		D			
PTFE with graphite filling								•		40 °C (104 °F)	0.3 (0.66)	F			
PTFE with graphite filling, grooved								•		40 °C (104 °F)		L			
PTFE with graphite filling								•		90 °C (194 °F)		R			
PTFE with graphite filling, grooved								•		90 °C (194 °F)		M			
CrNiMo steel with carbon bearing surface								•			0.45 (0.99)	S			
CrNiMo steel with PTFE bearing surface								•			0.46 (1.01)	T			
PCTFE								•			0.16 (0.35)	H			
PCTFE, grooved								•				J			
Flow direction															
Mechanism shaft vertical		From left to right										1			
		From right to left										2			
		From front to back										3			
		From back to front										4			
Mechanism shaft horizontal		From left to right										5			
		From right to left										6			
		Upwards										7			
		Downwards										0			
Mechanical registers/quantity preset registers¹⁾										Weight approx. kg (lb)					
Single- pointer dial															
• Type 01											0.8 (1.76)	0	1		
Double-pointer dial															
• Type 11, vertical mounting											1.5 (3.3)	1	1		
• Type 12, horizontal mounting											2.5 (5.5)	1	2		
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)															
• Type 30											11 (24.3)	3	0		
• Type 30, ex-protected switch											13.2 (29.1)	5	4		
Value per revolution															
• 1 l (0.26 USg)											11 (24.3)			1	
• 10 l (2.65 USg)											13.2 (29.1)			2	
Accessories (pulsers, cooling attachments)¹⁾															
• None														A	
• Mounted														B	
• Pulser already mounted <u>above</u> the intermediate gear:															
- 10 pulses/value per revolution														C	
- 100 pulses/value per revolution														D	
• Pulser already mounted <u>below</u> the intermediate gear:															
- 10 pulses/measuring chamber volume														G	
- 100 pulses/measuring chamber volume														H	

For Selection and Ordering data of „Digital register with current and pulse output“, „Tests“ und „Flanges“ see page 3/454.

Heating systems on request.

¹⁾ For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

Flow Measurement

SITRANS F R

Rotary-piston meters – Ordering data - DN 50 (2"), rated flow rate 500 l/min (132 USgpm)

Selection and Ordering data						Article No.	Order code
Rotary piston meter DN 50 (2")							
Nom. press.	Materials		Casing gasket			Weight appr. kg (lb)	
	Housing	Meas. chamber	Rotary piston				
PN 6 (87 psi)	Cast iron	Cast iron	• • • • •	Flat gasket AFM 34	31 (68.3)	7MR1410 - E	
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	• • • • •			7MR1410 - S	
PN 25 (363 psi)	Spher. cast iron	Cast iron	• • • • •		45 (99.2)	7MR1420 - E	
PN 40 (580 psi)	Cast steel	Cast iron	• • • • •	FKM (O-ring)	60 (132)	7MR1430 - E	
PN 63 (914 psi)	Cast steel	Cast iron	• • • • •	Flat gasket AFM 34	94 (207)	7MR1440 - E	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.							
Rotary piston material							
					Max. permissible liquid temperature	Weight appr. kg (lb)	
Carbon						0.9 (2.0)	K
Cast iron						3.5 (7.7)	E
Cast iron, grooved						3.4 (7.5)	B
Ni-resist						3.5 (7.7)	N
Ni-resist, grooved						3.4 (7.5)	C
Hard rubber					40 °C (104 °F)	0.7 (1.5)	G
Hard rubber, grooved					40 °C (104 °F)		D
PTFE with graphite filling					40 °C (104 °F)	0.5 (1.1)	F
PTFE with graphite filling, grooved					40 °C (104 °F)		L
PTFE with graphite filling					90 °C (194 °F)		R
PTFE with graphite filling, grooved					90 °C (194 °F)		M
Flow direction							
Mechanism shaft vertical	From left to right						1
	From right to left						2
	From front to back						3
	From back to front						4
Mechanism shaft horizontal	From left to right						5
	From right to left						6
	Upwards						7
	Downwards						0
Mechanical registers/quantity preset registers¹⁾							
Single- pointer dial					Weight appr. kg (lb)		
• Type 01					0.8 (1.76)		01
Double-pointer dial					1.5 (3.3)		11
• Type 11, vertical mounting							
• Type 12, horizontal mounting					2.5 (5.5)		12
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)							
• Type 30					11 (24.3)		30
• Type 30, ex-protected switch					13.2 (29.1)		54
Value per revolution							
• 10 l (2.65 USg)							2
• 100 l (26.5 USg)							3
Accessories (pulsers, cooling attachments)¹⁾							
• None							A
• Mounted							B
• Pulsar already mounted <u>above</u> the intermediate gear:							
- 10 pulses/value per revolution							C
- 100 pulses/value per revolution							D
• Pulsar already mounted <u>below</u> the intermediate gear:							
- 10 pulses/measuring chamber volume							G
- 100 pulses/measuring chamber volume							H

For Selection and Ordering data of „Digital register with current and pulse output“, „Tests“ und „Flanges“ see page 3/454.
Heating systems on request.

¹⁾ For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
 For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

Rotary-piston meters – Ordering data - DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data					Article No.	Order code	
Rotary piston meter DN 80 (3")							
Nom. press.	Materials		Casing gasket		Weight appr. kg (lb)		
	Housing	Meas. chamber					
PN 25 (363 psi)	Spher. cast iron	Cast iron	• • • •		108 (238)	7MR1620 - E - - - - -	
PN 40 (580 psi)	Cast steel	Cast iron	• • • •	FKM (O-ring)	150 (331)	7MR1630 - E - - - - -	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.							
↓ ↓ ↓ ↓							
Rotary piston material					Max. permissible liquid temperature	Weight appr. kg (lb)	
Carbon						2 (4.4)	K
Cast iron						9.5 (21)	E
Cast iron, grooved						9.4 (20.7)	B
Ni-resist						10 (22)	N
Ni-resist, grooved						9.6 (21.2)	C
Hard rubber					40 °C (104 °F)	2 (4.4)	G
Hard rubber, grooved					40 °C (104 °F)	1.8 (4)	D
Flow direction							
Mechanism shaft vertical		From left to right					1
		From right to left					2
		From front to back					3
		From back to front					4
Mechanism shaft horizontal		From left to right					5
		From right to left					6
		Upwards					7
		Downwards					0
Mechanical registers/quantity preset registers¹⁾					Weight appr. kg (lb)		
Single- pointer dial							
• Type 01					0.8 (1.76)		0 1
Double-pointer dial							
• Type 11, vertical mounting					1.5 (3.3)		1 1
• Type 12, horizontal mounting					2.5 (5.5)		1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)							
• Type 30					11 (24.3)		3 0
• Type 30, ex-protected switch					13.2 (29.1)		5 4
Value per revolution							
• 100 l (26.5 USg)							3
• 1000 l (265 USg)							4
Accessories (pulsers, cooling attachments)¹⁾							
• None							A
• Mounted							B
• Pulsar already mounted <u>above</u> the intermediate gear:							
- 10 pulses/value per revolution							C
- 100 pulses/value per revolution							D
• Pulsar already mounted <u>below</u> the intermediate gear:							
- 10 pulses/measuring chamber volume							G
- 100 pulses/measuring chamber volume							H

For Selection and Ordering data of „Digital register with current and pulse output“, „Tests“ und „Flanges“ see page 3/454.
Heating systems on request.

¹⁾ For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
 For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

Flow Measurement

SITRANS F R

Rotary piston meters – Ordering data - DN 15 (½") to DN 80 (3")

Selection and Ordering data

Rotary piston meter DN 15 (½") to DN 80 (3")

Digital register with current/pulse output

As separate model: Pulsar mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately)

10 pulses/revolution

- max. material temperature 80 °C (176 °F), without cooling attachment
- max. material temperature 180 °C (356 °F), one cooling attachment
- max. material temperature 260 °C (500 °F), two cooling attachments

100 pulses/revolution

- max. material temperature 80 °C (176 °F), without cooling attachment
- max. material temperature 180 °C (356 °F), one cooling attachment
- max. material temperature 260 °C (500 °F), two cooling attachments

Compact version: Pulsar mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately) mounted on mounting bracket.

10 pulses/revolution

- max. material temperature 80 °C (176 °F), without cooling attachment
- max. material temperature 180 °C (356 °F), one cooling attachment
- max. material temperature 260 °C (500 °F), two cooling attachments

100 pulses/revolution

- max. material temperature 80 °C (176 °F), without cooling attachment
- max. material temperature 180 °C (356 °F), one cooling attachment
- max. material temperature 260 °C (500 °F), two cooling attachments

Tests

Works test

Works test certificate

Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)

Preliminary official test (only for vertical mechanism shaft and mech. Register or quantity preset register

and pulser (double pick-up) for current/pulse output);

(not currently available in connection with SITRANS F RA110)

Flanges

Plane, drilled to EN 1092-1

Plane, drilled to specification

With sealing ridge to specification

¹⁾ Not with PTFE and PCTFE pistons.

Article No.

Order code

Article No.	Order code
7MR1 0 - - - - -	
4 1	0 B
4 3	0 B
4 5	0 B
4 6	0 B
4 7	0 B
4 8	0 B
6 1	0 B
6 3	0 B
6 5	0 B
6 6	0 B
6 7	0 B
6 8	0 B
	A
	B
	D ¹⁾
	E ¹⁾
	0
	9 R 1 Y
	9 R 2 Y

Further designs

Order code

Article No. of the rotary-piston meter
7MR1 - - - - - Z

Material acceptance test to EN 10 204-3.1

E01

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

- 7MR1020: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
- 7MR1110, 7MR1020, 7MR1130 and 7MR1140: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
- 7MR1410 and 7MR1420: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
- 7MR1430 and 7MR1440: for liquids of group 2; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP);
For liquids of fluid group 1 on request.
- 7MR1620 and 7MR1630: for liquids of fluid group 2; complies with requirements of article 3, para. 3 (SEP)

Rotary-piston meters - Ordering data - Automatic batchmeter DN 25 (1") and DN 50 (2")

Selection and Ordering data						Article No.	Order code
Automatic batchmeter DN 25 (1")							
With mechanical shut-off valve downstream of metering mechanism							
Nominal pressure	Materials				Weight appr. kg (lb)		
	Housing	Meas. chamber	Rotary piston				
PN 10 (145 psi)	Cast iron	Cast iron	• • • • • • • •		38 (83.8)	7MR111 - E - - - - -	- - - - -
	CrNiMo steel	CrNiMo steel	• • • • • • • •			7MR111 - S - - - - -	- - - - -
			↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓				
Automatic batchmeter DN 50 (2")							
With mechanical shut-off valve downstream of metering mechanism							
Nominal pressure	Materials				Weight appr. kg (lb)		
	Housing	Meas. chamber	Rotary piston				
PN 6 (87 psi) ¹⁾	Cast iron	Cast iron	• • • • • • • •		58.5 (129)	7MR141 - E - - - - -	- - - - -
PN 10 (145 psi)	CrNiMo steel	CrNiMo steel	• • • • • • • •			7MR141 - S - - - - -	- - - - -
Rotary piston material						Max. permissible liquid temperature	Weight appr. kg (lb)
Carbon							0.15 (0.3)
Cast iron							0.55 (1.2)
Cast iron, grooved							0.5 (1.1)
Ni-resist							0.55 (1.2)
Ni-resist, grooved							0.5 (1.1)
Hard rubber					40 °C (104 °F)		0.1 (0.2)
Hard rubber, grooved					40 °C (104 °F)		
PTFE with graphite filling					40 °C (104 °F)		0.3 (0.7)
PTFE with graphite filling, grooved					40 °C (104 °F)		
PTFE with graphite filling					90 °C (194 °F)		
PTFE with graphite filling, grooved					90 °C (194 °F)		
PCTFE (only DN 25)					40 °C (104 °F)		0.16 (0.4)
PCTFE, grooved (only DN 25)					40 °C (104 °F)		
CrNiMo with carbon contact surface							0.4 (0.9)
CrNiMo with PTFE contact surface							
Tapet bushing							
• With maintenance-free sealed bushing						2	
• With bellows ²⁾³⁾						3	
Flow direction							
Mechanism shaft always vertical							
• From left to right, valve right						1	
• From right to left, valve left						2	
Quantity preset register							
• Type 30							3 0
• Type 30, ex-protected switch							5 4
Value per revolution and adjustment step							
1 l/0.1 : 0.1 l (only DN 25)							1
10 l/1 : 1 l							2
100 l/10 : 1 l (only DN 50)							3
Accessories							
Without							A
Mounted							B
Tests							
Works test							A
Works test certificate							B
Preliminary official test							C
Flanges							
Plane, drilled to EN 1092-1							0
Plane, drilled to specification							9 R 1 Y
With sealing ridge to specification							9 R 2 Y

Note: If pressure impacts are likely, the valve should be before the automatic batchmeter in the direction of flow.

¹⁾ Flange connections drilled to PN 10/16 (MWP 145/232 psi)

²⁾ Restricted operating conditions (max. 40 °C (104 °F), max. 3 bar (43.5 psi))

³⁾ Separate Article No. required (see Selection and Ordering data table „Accessories“)

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

For liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

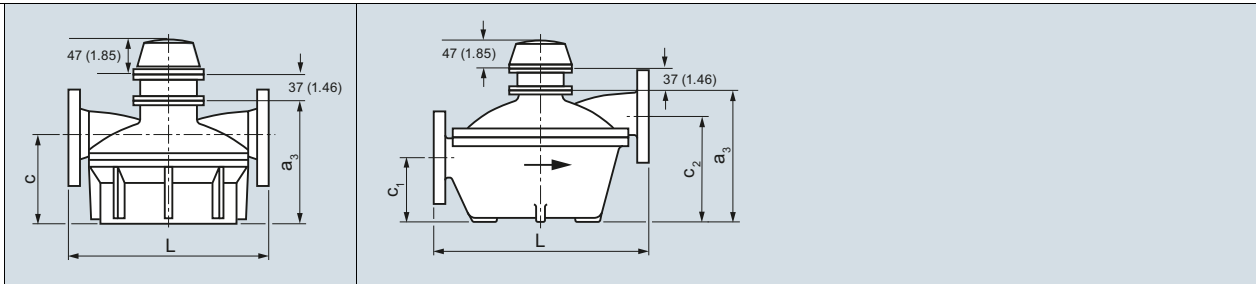
Flow Measurement

SITRANS F R

Rotary-piston meters and Automatic batchmeter - Dimensional drawings

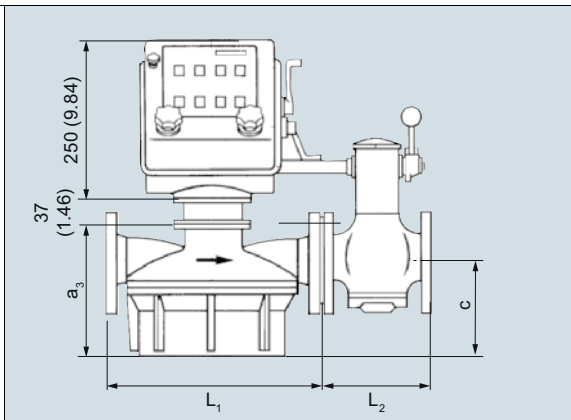
Dimensional drawings

Rotary-piston meter with single pointer dial and intermediate gear



	DN 25	DN 50	DN 80	DN 15		DN 25		DN 50		DN 80	
				PN 25	PN 40	PN 25 and PN 40	PN 63	PN 25 and PN 40	PN 63	PN 25 and PN 40	PN 63
L	210 (8.27)	325 (12.80)	410 (16.14)	200 (7.87)	200 (7.87)	270 (10.63)	300 (11.81)	400 (15.75)	470 (18.50)	540 (21.26)	600 (23.62)
C	90 (3.54)	147 (5.79)	185 (7.28)	-	-	-	-	-	-	-	-
C₁	-	-	-	50 (1.97)	68 (2.68)	80 (3.15)	82 (3.23)	120 (4.72)	120 (4.72)	155 (6.10)	177 (6.97)
C₂	-	-	-	83.5 (5.67)	108 (4.25)	144 (5.67)	157 (6.18)	205 (8.07)	230 (9.06)	271 (10.67)	312 (12.28)
a₃	153 (6.02)	205 (8.07)	244 (9.61)	140 (8.19)	165 (6.50)	208 (8.19)	224 (8.82)	263 (10.35)	285 (11.22)	331 (13.03)	387 (15.24)

Automatic batchmeter with quantity preset register intermediate gear



	DN 25	DN 50
L₁	210 (8.27)	325 (12.80)
L₂	135 (5.31)	175 (6.89)
C	90 (3.54)	147 (5.79)
a₃	153 (6.02)	205 (8.07)

In addition to dimension a₃ the following dimensions need to be added for extra add-on components (dimensions in mm (inch))

Addition of	a ₃ +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
Mounting bracket and electronic flow register	200 (7.87)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Quantity preset register	287 (11.30)

Overview



Application

The display of the electric flow register is a universal LCD for converting the measured value and displaying the current value, total value and accumulated total. Depending on the design, the flow register can be provided with a scaleable pulse output for the total value and/or a current output of 0/4 to 20 mA.

Design

The electric flow register is fitted with a large, extremely clear LCD (90 x 40 mm in size), where the flow and total value are displayed with seven 17 mm digits and 8 mm digits respectively. Units, time units, flow trend and device status are displayed in addition.

The electronics is fitted in a rugged aluminum housing (IP67) with three large keys. The alphanumeric menu structure in English or German permits simple configuring and can be used for many applications.

Models 61, 63, 65 and 66, 67, 68 are supplied with the electric flow register already mounted on the pulser.

Function

The flow register of the SITRANS F RA110 receives, e.g. from a pulser, information on the current flow. This information is converted into the flow per second, minute, hour or day using a programmable 7-digit K-factor. Conversion is also carried out for the total values and accumulated totals. The units for the flow and accumulated total are completely independent.

The total value can be reset by pressing the "CLEAR" key twice. The accumulated total cannot be reset and is displayed with 11 digits.

The standard configuration displays the total value (17 mm digits) and the flow (8 mm digits) simultaneously. It is also possible to output the current value on the 17 mm digits. In this case, the total value is displayed by pressing "SELECT". The electric register has inputs for Namur sensors. Connection is possible to practically every available sensor system.

The active and passive 0/4 to 20 mA analog output has a resolution of 12 bits and can be connected to a load of 750 Ω .

The pulse output can be exactly defined, e.g. to generate one pulse per 3.5 liters. The pulse lengths can be set to 1 to 9 999 ms. The maximum output frequency is limited to 500 Hz. The transistor can switch max. 50 V DC/ 300 mA.

All configuration parameters are saved in an EEPROM. The total value and the accumulated total are saved once a minute, so that only a minimum amount of information is lost in the event of a power failure.

The SITRANS F RA110 can be ordered with powerful LED background lighting for use under unfavorable viewing conditions. The menu language of the displays can be set to German or English.

Technical specifications

Input	
Pulse input	NAMUR signal
Frequency	NAMUR: 0 ... 500 Hz
Sensor supply	8.2 V or 24 V DC
Output	
Pulse output	Max. frequency 500 Hz, pulse width 1 ... 9999 ms adjustable. Type: Transistor output, max. load 24 V DC/170 mA (active) and 50 V DC/300 mA (passive)
Analog output	Range 0/4 ... 20 mA, accuracy: $\pm 0.1\%$, resolution 12 bit, response time (10 ... 90 %): 100 ms, load max. 750 Ω , active or passive, function: flow 0/4 ... 20 mA freely adjustable
Functionality	
Operator	The total value and flow are displayed. The total value is deleted by double-pressing the "CLEAR" key. The total value and the accumulated total are displayed by pressing the "SELECT" key.
Total value	17 mm (0.67 inch) high, 7 digits, max. 3 decimal places; the total value can not be deleted. Units: l, m ³ , gal, USg, kg, lb, bbl or none K-factor: 7-digit 0.000010 to 9 999 999 Settings independent of flow
Accumulated total	8 mm high (0.31 inch), max. 11 digits, max. 3 decimal places, the accumulated total cannot be reset
Flow rate	8 mm (0.31 inch) or 17 mm (0.65 inch) high, max. 7 digits, max. 3 decimal places Units: ml, l, m ³ , mg, g, kg, ton, NI, Nm ³ , scf, ref, cf, lb, bbl, gal or none Time units: second, minute, hour, day
Rated conditions	
Operating temperature	-40 ... +80 °C (-40 ... +176 °F)
Degree of protection	IP67 (NEMA 4)
Design	
Material	Housing: aluminum, UV-resistant powder coating Window: Polycarbonate Gasket material: Silicone
Dimensions	See dimensional drawings
Power supply	
Power supply with	24 V AC/DC $\pm 10\%$ or 115/230 V AC $\pm 10\%$
Power consumption	Max. 9 W
Certificate and approvals	
Ex protection	EEx ia IIB/IIC T4
For official calibration inspections	In preparation

Flow Measurement

SITRANS F R

SITRANS F RA110 electric flow register

Selection and Ordering data

Electric flow register SITRANS F RA110

Electric register in aluminum housing for display of flow and total quantity, 7-digit LCD, IP67 (NEMA 4), without explosion protection, menu language German/English

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Signal input

NAMUR signal

Article No.

7MV1070-

- A 0

1

Power supply

Incl. sensor supply 8.2 V DC

24 V AC/DC¹⁾

230 V AC¹⁾

16 ... 30 V DC²⁾

A

B

C

Function (output)

Display of flow and total value

Additional active pulse output¹⁾

Additional passive pulse output

Additional active pulse output and current output¹⁾

Additional passive pulse output and current output

A 0

B 1

B 2

C 1

C 2

Installation

For wall mounting

For additional mounting at compact version

0

1

Explosion protection

without

EEx ia IIB/IIC T4 up to max. 100 °C

0

1

LED background lighting

without

with background lighting

A

B

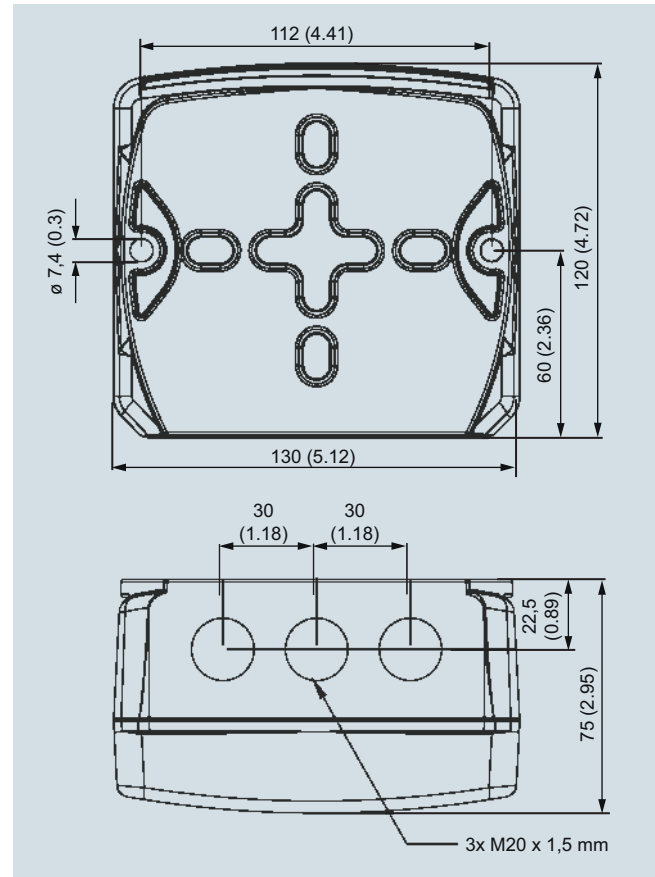
¹⁾ Not for ATEX version

²⁾ For ATEX version only

Note:

Cable glands for M20 are not included in delivery.

Dimensional drawings



Electric flow register SITRANS F RA110, dimensions in mm (inch)

Overview



Pulser with inductive pick-up

The pulser is used for quantity metering in conjunction with electromechanical pulse counters as a transmitter with output signals for electronic data processing.

Using the pulser, quantity measurements from volumetric meters can be converted into electrical pulses for remote transmission.

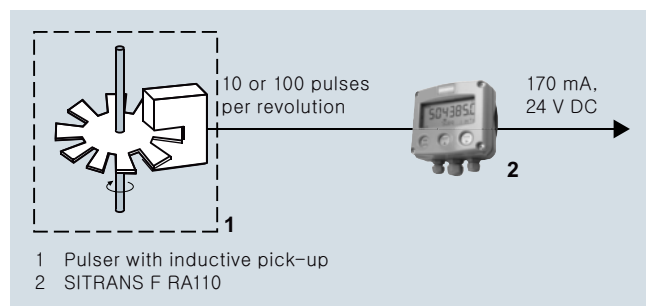
Design

- Electronic design
- High pulse frequency ($\leq 3\,000\text{ Hz}$)
- Electronic output
 - 170 mA, 24 V DC (delivering current) for electromechanical pulse counters
 - 2 mA, 24 V DC (absorbing current) for electronic processing

Function

Pulse valence with quantity measurements

Conversion of metered quantities into electrical pulses



Measuring system for remote metering and digital data processing

The metering shaft of the volumetric meter drives a pulse disk. The vanes of the pulse disk successively enter the air gap of an inductive pick-up, thus changing the coupling between two coils. This causes a change in resistance that is converted into a pulse by the subsequent pulse amplifier, which also powers the pick-up.

The pulser operates without contacts. No measurable force is exerted on the disk. Hence the system is free from feed-backs.

Depending on the design, 10 or 100 pulses are produced for each revolution of the drive. The pulse amplifier amplifies the incoming pulses. A timing circuit prevents a continuous output pulse.

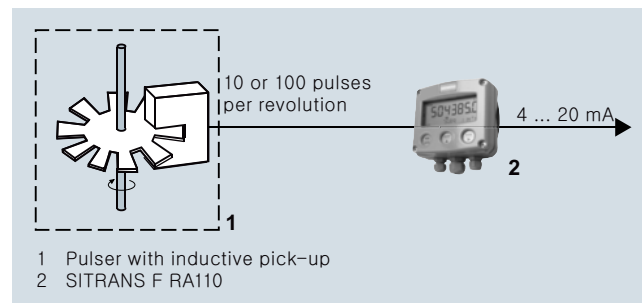
The quantitative value associated with one pulse depends on the value per revolution of the drive (pulses per liter or gallon) or on the respective volume of the measuring chamber of the drive.

The selection of the pulser – whether 10 or 100 pulses per drive revolution – is to be made according to the desired resolution.

Pulsers with two inductive pick-ups are available for systems for custody transfer since at present the PTB regulations specify a duplicated transmission system with pulse comparison.

Pulse valence with flow rate measurements

Conversion of metered quantities into electrical pulses



Measuring system for flow-rate measurement

During flow measurements, the change in resistance is converted to pulses by SITRANS F RA110. Each pulse corresponds to a given quantity of metered liquid. The number of pulses per unit in time (the frequency) is a measure of the flow rate.

SITRANS F RA110 converts the incoming NAMUR signals into load-independent direct current.

The electric pulser is available for 10 or 100 pulses per revolution. The choice depends on the smallest flow rate still to be indicated.

Flow Measurement

SITRANS F R

Pulser with inductive pick-up

Technical specifications

Slot initiator	Sensor SJ 3,5 -N-K37
Power supply (from pulse amplifier)	8 V DC, R_i approx. 1 k Ω (DIN 19234) $C_i = 40$ nF; $L_i = 160$ μ H
Change in current consumption on pulse	≤ 1 mA / ≤ 3 mA (DIN 19234)
Permissible line impedance between pick-up and amplifier	≤ 50 Ω (DIN 19234)
Number of pulses per revolution of the drive	10 or 100
Phase position of the channels of the double pick-up	180° : 180° \pm 30° Electrically offset 90° \pm 30°
Duty factor	1 : 1 \pm 17%
Max. pulse frequency	3000 Hz
Pulse valence	Dependent on value per revolution of the drive of the respective meter
Permissible ambient temperature	-25 ... +100 °C (-13 ... +212 °F)
Degree of protection	IP43 to EN 60529 with register P65 to EN 60529 with protective cover This pulser has the EC-Type Examination Certificate PTB 99 ATEX 2219X.
Mounting position	Any
Weight approx.	1.2 kg (2.65 lb)
Ex approval	IIG EEx ia IIC T6

Selection and Ordering data

Pulser with inductive pick-up

Weight approx. 1.2 kg (2.65 lb)

Single pick-up

- 10 pulses/revolution
- 100 pulses/revolution

Double pick-up¹⁾
(for custody transfer installations)

- 10 pulses/revolution
- 100 pulses/revolution

Instruction Manual

German/English

¹⁾ Pulse channels electrically offset by 90°

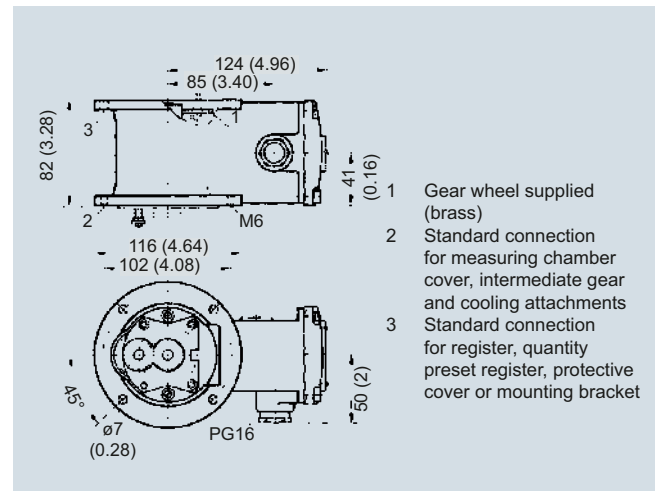
Article No.

7MV1105-1AA00
7MV1105-2AA00

7MV1105-3AA01
7MV1105-4AA01

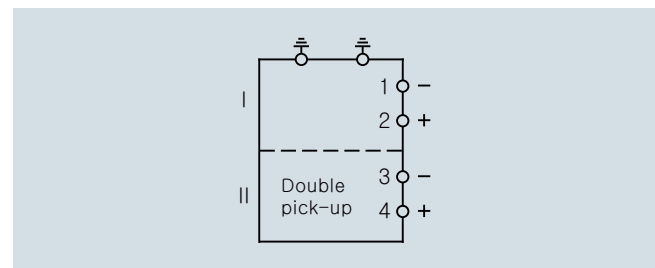
C73000-B5174-C25

Dimensional drawings



Pulser with inductive pick-up, dimensions in mm (inch)

Schematics



Pulser with inductive pick-up, connection diagram for clockwise rotation; pick-up I to terminals 3 and 4 for counter-clockwise rotation

Level Measurement



4/2

Overview**Point level measurement**

- 4/9 Capacitance switches
- 4/12 – Pointek CLS100
- 4/18 – Pointek CLS200 – Standard
- 4/27 – Pointek CLS200 – Digital
- 4/36 – Pointek CLS200 – Standard and Digital
- 4/44 – Pointek CLS300 – Standard
- 4/51 – Pointek CLS300 – Digital
- 4/57 – Pointek CLS300 – Standard and Digital
- 4/64 – Pointek CLS500
- 4/80 – Pointek CLS Specials
- Vibrating switches
- 4/82 – SITRANS LVL100
- 4/88 – SITRANS LVL200
- 4/104 – SITRANS LVS100
- 4/107 – SITRANS LVS200
- Rotation paddle switches
- 4/116 – SITRANS LPS200
- Ultrasonic non-contacting switch
- 4/127 – Pointek ULS200

Continuous level measurement

- 4/132 Ultrasonic
- Ultrasonic transmitters
- 4/136 – SITRANS Probe LU
- 4/141 – The Probe
- Ultrasonic controllers
- 4/144 – SITRANS LUT400 series
- 4/152 – MultiRanger 100/200
- 4/156 – HydroRanger 200
- 4/160 – SITRANS LU01 and LU02
- 4/164 – SITRANS LU10
- 4/168 – SITRANS LU AO
- Ultrasonic transducers
- 4/171 – ST-H
- 4/174 – EchoMax XRS-5
- 4/178 – EchoMax XPS

Continuous level measurement (continued)

- Accessories for ultrasonic
- 4/185 – EA aiming devices
- 4/187 – FMS mounting brackets
- 4/189 – TS-3 temperature sensor
- 4/191 Radar transmitters
- 4/194 – SITRANS Probe LR
- 4/198 – SITRANS LR200
- 4/207 – SITRANS LR200 Antennas
- 4/210 – SITRANS LR200 Specials
- 4/213 – SITRANS LR250 Horn Antenna
- 4/225 – SITRANS LR250 Specials
- 4/226 – SITRANS LR250 threaded PVDF antenna
- 4/232 – SITRANS LR250 threaded PVDF Specials
- 4/233 – SITRANS LR250 Flanged Encapsulated Antenna
- 4/242 – SITRANS LR250 Flanged Encapsulated Specials
- 4/243 – SITRANS LR250 Hygienic Encapsulated Antenna
- 4/268 – SITRANS LR250 Hygienic Encapsulated Specials
- 4/269 – SITRANS LR260
- 4/274 – SITRANS LR460
- 4/279 – SITRANS LR260/LR460 Specials
- 4/280 – SITRANS LR560
- 4/285 – SITRANS LR560 Specials
- 4/286 Guided wave radar transmitters
- 4/289 – SITRANS LG series
- Capacitance transmitters
- 4/322 – SITRANS LC300
- 4/336 – SITRANS LC500
- 4/359 – SITRANS LC300 and LC500 Specials

Communication





- 4/360 SmartLinx module
- 4/361 Dolphin Plus Software



You can download all instructions, catalogs and certificates for SITRANS L free of charge: www.siemens.com/level

Level Measurement

Product Overview

Overview





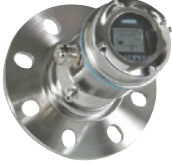
	Application	Device description	Page	Programming Software
Point level measurement - Capacitance switches				
	Powerful range of level switches suitable for a variety of industries	Pointek CLS100/CLS200/CLS300/CLS500	4/12	SIMATIC PDM
		<ul style="list-style-type: none"> CLS100: compact 2-wire inverse frequency shift capacitance switch for level detection in constricted spaces, interfaces, solids, liquids, slurries, and foam 	4/18	SIMATIC PDM
		<ul style="list-style-type: none"> CLS200: a versatile inverse frequency shift capacitance level switch with optional rod/cable choices and configurable output, ideal for detection of liquids, solids, slurries, foam, and interfaces; digital version (with PROFIBUS PA) includes a display and provides additional diagnostic features 	4/44	SIMATIC PDM
		<ul style="list-style-type: none"> CLS300: inverse frequency shift capacitance level switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam and interfaces in demanding conditions where high pressure and temperatures are present; digital version (with PROFIBUS PA) includes a display and provides additional diagnostic features 	4/64	SIMATIC PDM
	Reliable vibrating point level switches for liquid and slurry applications across all industries	SITRANS LVL100/LVL200	4/82	-
		<ul style="list-style-type: none"> LVL100: compact vibrating level switch for use in liquid and slurry applications such as overflow, high, low, and demand level applications. Also ideal for dry run protection LVL200: advanced vibrating level switch for use in liquid and slurry applications. Suited for most hazardous area applications such as: overflow, high, low, demand, and dry run protection; can also be used for Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 	4/88	-
	Reliable vibrating point level switches for bulk solids in a wide variety of applications at a competitive price	SITRANS LVS100/LVS200	4/104	-
		Vibrating point level switch designed to be impervious to external vibrations and to provide reliable performance in demanding bulk solids applications	4/107	-
		<ul style="list-style-type: none"> LVS100 LVS200 		
Point level measurement - Rotating paddle switch				
	Reliable rotating point level switches for bulk solids in a wide variety of applications at a competitive price	SITRANS LPS200	4/116	-
		<ul style="list-style-type: none"> Rotating paddle switch for detection of high, low, and demand levels for a wide variety of bulk solids industries. Unique engineering provides long-lasting reliable performance 		

Application	Device description	Page	Programming Software
Point level measurement - Ultrasonic non-contacting switch			
	<p>Ultrasonic non-contacting switch with two switch points for level detection of bulk solids, liquids and slurries in a wide variety of industries</p> <p>Pointek ULS200</p> <ul style="list-style-type: none"> • Rugged design, no moving parts, and virtually maintenance-free • Transducer available in ETFE or PVDF copolymer and therefore inert to most chemicals 	4/127	-
Continuous measurement - Ultrasonic transmitters			
	<p>2-wire loop powered ultrasonic transmitter for level, volume, and flow monitoring of liquids in open channels, storage vessels and simple process vessels</p> <p>SITRANS Probe LU</p> <ul style="list-style-type: none"> • Continuous level measurement up to 12 m (40 ft) range • Patented Sonic Intelligence signal processing • Auto False-Echo Suppression 	4/136	-
	<p>Compact level transmitter with integrated transducer for accurate level measurement for liquid applications</p> <p>The Probe</p> <ul style="list-style-type: none"> • Simple, compact and competitively priced ultrasonic level transmitter in several versions for maximum versatility: <ul style="list-style-type: none"> - Three-wire system with alarm relay - Two-wire system with current loop 	4/141	SIMATIC PDM
Continuous measurement - Ultrasonic controllers			
	<p>The Siemens SITRANS LUT400 series controllers are compact, single point, long-range ultrasonic controllers for continuous level or volume measurement of liquids, slurries, and solids, and high accuracy monitoring of open channel flow.</p> <p>SITRANS LUT420/430/440</p> <p>In addition to industry leading 1 mm (0.04 inch) accuracy, each of the three models in the series are compatible with our full range of EchoMax transducers and offer varying degrees of pump, alarm, and other control functionality, all from a very compact and easy-to-use interface.</p> <ul style="list-style-type: none"> • 1 mm accuracy • HART communications • Next Generation Sonic Intelligence 	4/144	SIMATIC PDM
	<p>Versatile short- to medium-range ultrasonic single- and dual-vessel level controller for virtually any application in a wide range of industries</p> <p>MultiRanger 100/200</p> <ul style="list-style-type: none"> • Using non-contacting ultrasonic technology, the controller measures the level in short to medium range applications up to 15 m (50 ft) of solids, liquids, or slurries • Auto False-Echo Suppression of false echoes 	4/152	SIMATIC PDM
	<p>Ultrasonic level controller for up to six pumps - control, differential control, and open channel flow monitoring</p> <p>HydroRanger 200</p> <ul style="list-style-type: none"> • An economical, low-maintenance solution delivering control efficiency and productivity needed to meet today's exacting standards • Auto False-Echo Suppression of false echoes 	4/156	SIMATIC PDM

Level Measurement

Product Overview




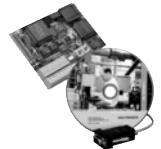
	Application	Device description	Page	Programming Software
	Ultrasonic long-range level monitoring system for liquids and solids	SITRANS LU01/LU02 SITRANS LU10 <ul style="list-style-type: none"> Automatic conversion of level into volume for standard or custom tank shapes Easy to install and program Optional fieldbus card, e.g. PROFIBUS DP 	4/160	Dolphin Plus
		4/164	Dolphin Plus	
	Output module for SITRANS LU10	SITRANS LU AO <ul style="list-style-type: none"> SITRANS LU AO analog output module provides remote analog outputs for the measurement points of the SITRANS LU10 transceiver 	4/168	-
Continuous measurement - Ultrasonic transducers				
	ST-H: ETFE or PVDF transducer for chemicals	ST-H/EchoMax XRS-5 <ul style="list-style-type: none"> ST-H: The narrow design of the ST-H allows the sensor to be mounted using a 2 inch connection 	4/171	-
	XRS-5: Standard transducer for applications to 8 m (26 ft)	<ul style="list-style-type: none"> XRS-5: narrow beam angle of only 10°, measuring range maximum 8 m (26 ft) for measurement of liquids, solids, and slurries 	4/174	-
	Transducers for liquids and bulk solids XPS series: Hermetically sealed PVDF enclosure for chemical immunity	EchoMax XPS <ul style="list-style-type: none"> XPS series offers versions for various distances up to 30 m (100 ft) and up to a maximum temperature of 95 °C (203 °F) 	4/178	-
Continuous measurement - Radar transmitters				
	2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage vessels with nominal pressure and temperature, to a range of 20 m (66 ft)	SITRANS Probe LR <ul style="list-style-type: none"> Uni-Construction polypropylene rod antenna standard Process Intelligence signal processing Auto False-Echo Suppression of false echoes 	4/194	SIMATIC PDM

	Application	Device description	Page	Programming Software
	<p>2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft)</p>	<p>SITRANS LR200</p> <ul style="list-style-type: none"> • Program without opening the lid, even in hazardous areas, using patented infrared IS handheld programmer • Special Uni-Construction hermetically sealed polypropylene rod antenna has integrated threaded connection • Built-in alphanumeric display with support in four languages 	4/198	SIMATIC PDM AMS SITRANS DTM
	<p>2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft); antenna designs ideal for small vessels, low dielectric media, food & beverages and corrosive/aggressive media</p>	<p>SITRANS LR250 <i>NEW</i></p> <ul style="list-style-type: none"> • Simple operation using the graphical local user interface (LUI) • Plug-and-play setup using the intuitive Quick Start Wizard • 25 GHz high frequency allows for small horn antennas and easy mounting in nozzles • Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions 	4/213	SIMATIC PDM AMS SITRANS DTM
	<p>2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of solids and liquids up to 30 m (98.4 ft); ideal for measurement in extreme dust and high temperatures</p>	<p>SITRANS LR260</p> <ul style="list-style-type: none"> • Simple operation using the graphical local user interface (LUI) • Plug-and-play setup using the intuitive Quick Start Wizard • 25 GHz high frequency allows for small horn antennas and easy mounting in nozzles • Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions 	4/269	SIMATIC PDM
	<p>4-wire, 24 GHz FMCW radar level transmitter with extremely high signal-to-noise ratio and advanced signal processing for continuous monitoring of solids up to 100 m (328 ft); ideal for measurement in extreme dust</p>	<p>SITRANS LR460</p> <ul style="list-style-type: none"> • Process Intelligence for advanced signal processing and quick and easy adjustment • Self-guided Quick Start Wizard for plug and play start-up • 100 m (328 ft) range for long-range and difficult applications 	4/274	SIMATIC PDM
	<p>2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids in silos to a range of 100 m (329 ft)</p>	<p>SITRANS LR560</p> <ul style="list-style-type: none"> • Rugged stainless steel design • 78 GHz high frequency provides very narrow beam, virtually no mounting nozzle noise, and optimal reflection from sloped solids • Aimer option to direct beam to area of interest, such as draw point of cone • Air purge connection is included for self-cleaning of extremely sticky solids • Lens antenna is highly resistant to product build-up • Local display interface (LDI) allows local programming and diagnostics 	4/280	SIMATIC PDM AMS SITRANS DTM

Level Measurement

Product Overview

4

Application	Device description	Page	Programming Software
Continuous measurement - Guided wave radar transmitters			
	<p>Guided wave radar transmitters for short- and medium-range level, level/interface, and volume measurement of liquids, slurries, and solids. The four LG models are unaffected by changes in process conditions, high temperatures and pressures, and provide a wide range of hygienic options.</p>	<p>SITRANS LG240/250/260/270 <i>NEW</i></p> <ul style="list-style-type: none"> Measures accurately on materials with dielectric (dK) as low as 1.4 Guided wave radar measurement for up to 2 mm (0.08 inch) accuracy Measures level, level/interface, and volume of solids, slurries, and liquids 4 button programming for quick setup Reliable level measurement on harsh applications with pressure up to 400 bar g (40 000 kPa) and temperatures as high as 450 °C (842 °F) 	<p>4/289</p> <p>SIMATIC PDM</p>
Continuous level - Capacitance transmitters			
	<p>For liquids and solids applications, ideal for standard industrial applications in chemical, hydrocarbon processing, food and beverage, and mining, aggregate and cement industries</p>	<p>SITRANS LC300</p> <ul style="list-style-type: none"> Sophisticated, but easy-to-adjust microprocessor combined with field-proven probes Patented active shield technology ensures measurements are unaffected by vapors, product deposits, dust, and condensation 	<p>4/322</p> <p>-</p>
	<p>Level and interface transmitter for extreme and critical process conditions, such as oil and liquid natural gas (LNG), toxic and aggressive chemicals and vapours</p>	<p>SITRANS LC500</p> <ul style="list-style-type: none"> Equipped with the HART Smart protocol for remote setup and calibration Patented active shield technology ensures measurements are unaffected by vapors, product deposits, dust, and condensation 	<p>4/336</p> <p>SIMATIC PDM</p>
Communication			
	<p>SmartLinx Module, Dolphin Plus software</p> <ul style="list-style-type: none"> Optional communication modules, SmartLinx, provide direct digital connection to popular industrial fieldbus systems Dolphin Plus for quick and easy configuring, monitoring, tuning, and diagnostics of Siemens devices 	<p>4/360</p> <p>4/361</p>	<p>-</p> <p>-</p>

Continuous Level						
Conditions	Ultrasonic	Radar	Guided Wave Radar	Capacitance	Gravimetric	Hydrostatic pressure
Measurement						
Level	■	■	■	■	◆	■
Interface (liquid/liquid)			■	◆		■
Interface (liquid/solid)	◆			◆		
Volume	■	■	◆	◆	◆	■
Mass					■	■
Flow (open channel)	■	◆				
Level Applications						
Changing density	■	■	■	■		
Changing dielectric	■	■	■	◆	■	■
Aggressive chemicals	■	■	■	■	■	■
Pressure/vacuum		■	■	■	■	■
High temperature		■	■	■	■	■
Cryogenic			■	■	■	
Turbulence	■	■	◆	◆	■	■
Steam		◆	■	◆	■	■
Hydrocarbon vapors/solvents		■	■	■	■	■
Foam	◆	◆	◆	◆	■	■
Build-up	◆	◆	◆	◆	■	◆
High viscosity	■	■	◆	◆	■	◆
Dust	◆	■	■	■	■	
Solids powders	◆	■	◆	◆	■	
Solids granules/pellets < 25 mm (1 inch)	■	■	◆	◆	■	
Solids > 25 mm (1 inch)	■	■			■	
High angle of repose	◆	■	■	◆	■	

■ preferred

◆ condition dependent

Level Measurement

Product Overview

Level Measurement Selector

Point Level				
Conditions	Vibration	Capacitance	Paddle	Ultrasonic
Measurement				
Level	■	■	■	■
Interface (liquid/liquid)		■		
Interface (liquid/solid)	◆	◆		
Volume				
Mass				
Flow (open channel)				
Level Applications				
Changing density	■	■	■	■
Changing dielectric	■	◆	■	■
Aggressive chemicals	■	■	◆	■
Pressure/vacuum	■	■	■	
High temperature	■	■	■	
Cryogenic		■		
Turbulence	◆	◆		■
Steam	■	◆	■	
Hydrocarbon vapors/solvents	■	◆		
Foam	◆	◆		◆
Build-up	◆	◆	■	◆
High viscosity	◆	◆	◆	■
Dust	■	■	■	◆
Solids powders	■	◆	■	◆
Solids granules/pellets < 25 mm (1 inch)	■	◆	■	■
Solids > 25 mm (1 inch)	◆	◆	■	■
High angle of repose	■	■	■	◆

■ preferred

◆ condition dependent

Overview

Introduction

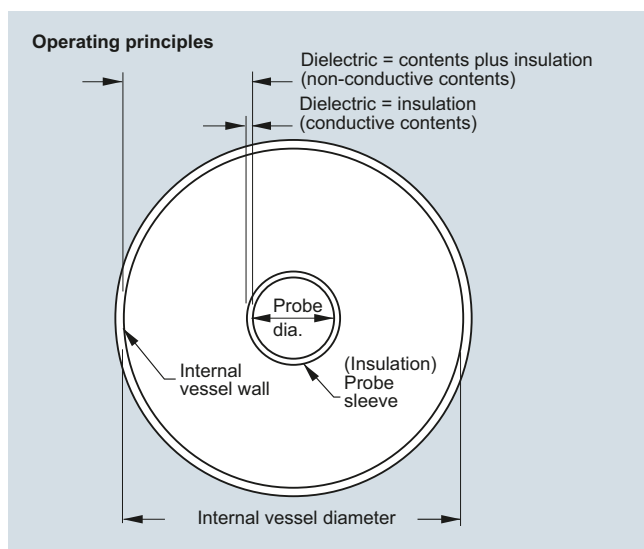
Inverse frequency shift capacitance point level and material detection switches are designed to withstand the harsh environments of high pressure and high temperature applications.

Inverse Frequency Technology

Siemens inverse frequency shift capacitance devices incorporate a unique frequency-based approach to level measurement. The capacitance units monitor the effect of capacitance based on frequency change. The relationship between capacitance and frequency is inverse. Because small level changes result in a large frequency change, the result is excellent resolution and accuracy.

Principle of Operation

Inverse frequency shift capacitance devices require two components: a reference electrode of a variable capacitor and the measurement electrode. In capacitive level measurement, the environment (typically the vessel wall) acts as the reference electrode, while the probe supplies the measurement electrode. The dielectric is composed of the vessel contents and, if the measurement electrode is insulated, the insulating layer.



Inverse frequency shift capacitance operation

Capacitance is affected by the surface area of the electrodes, the separation distance between the electrodes and the dielectric constant of the vessel contents. The dielectric constant is the measure of a material's ability to store energy. The relative dielectric constant of air (vacuum) is 1; all other materials have a higher value.

Mode of operation

Common Terms

Capacitance

The property of a system of conductors and dielectrics that permits the storage of electricity when a potential difference exists between the conductors. Its value is expressed as the ratio of a quantity of electricity to a potential difference and the unit is a Farad.

Capacitor

A device in a circuit that has the potential to store an electric charge. Typically a capacitor has two conductors or electrodes separated by a layer of a non-conducting material called a dielectric. With the conductors on opposite sides of the dielectric layer oppositely charged by a source of voltage, the electrical energy of the charged system is stored in the polarized dielectric.

Dielectric constant

The ability of a dielectric to store electrical potential energy under the influence of an electric field. This is measured by a ratio which compares the capacitance of a condenser with the material as dielectric to its capacitance with a vacuum/dry air as dielectric: the dielectric constant of air is 1.

Active shield

The portion of the probe isolated from the active measurement section. The sensor signal is connected to the active shield portion of the probe, eliminating the electrical potential difference between the shield and the measurement section. So, the shield portion of the probe near the process connection is not affected by changes in vapor concentration, material buildup, dust, or condensation.

Level Measurement

Point level measurement – Capacitance switches

Capacitance

Technical specifications

Point Level Measurement				
Criteria	Pointek CLS100	Pointek CLS200	Pointek CLS300	Pointek CLS500
Typical applications	Liquids, slurries, powders, granules, applications in constricted spaces	Liquids, slurries, powders, granules, foam, food, and pharmaceuticals, petrochemicals	Liquids, slurries, powders, granules, relatively high pressure and temperature, hazardous areas	Water in oil level, foam or liquid/ foam level, glycol regenerators, high-pressure coalescers
Max. length including sensor	100 mm (4 inch)	Rod: 5.5 m (18 ft) Cable: up to 30 m (98 ft)	Rod: 1 m (40 inch) Cable: 25 m (82 ft)	Rod: 1 m (40 inch)
Process temperature (Temperature ratings are pressure dependent. See Pressure/Temperature curves for respective product.)	Stainless steel process connection: • -30 ... +100 °C (22 ... +212 °F) Fully Synthetic (PPS process connection): • -10 ... +100 °C (14 ... 212 °F)	• -40 ... +85 °C (-40 ... +185 °F) • With thermal isolator: -40 ... +125 °C (-40 ... +257 °F)	• -40 ... +200 °C (-40 ... +392 °F) • HT version: -40 ... +400 °C (-40 ... +752 °F)	• -50 ... +200 °C (-58 ... +392 °F) • HT version: -60 ... +400 °C (-76 ... +752 °F)
Process pressure (Pressure ratings are temperature dependent. See Pressure/Temperature curves for respective product.)	Up to 10 bar g (146 psi g)	Rod versions: • Up to 25 bar g (365 psi g) Cable version: • Up to 10 bar g (146 psi g)	Up to 35 bar g (511 psi g)	• Up to 150 bar g (2 175 psi g)
Output	Stainless steel cable or enclosure version: • 4 ... 20/20 ... 4 mA 2-wire current loop • Solid-state output Fully-synthetic version (PPS) • Relay output	Standard: • 1 SPDT Form C relay, solid-state switch Digital: • Solid-state switch included	Standard: • 1 SPDT Form C relay, solid-state switch Digital: • Solid-state switch included	• 4 ... 20/20 ... 4 mA 2-wire current loop • Solid-state switch
Communications		Standard: • 3 LED indicators Digital: • PROFIBUS PA; SIMATIC PDM compatible	Standard: • 3 LED indicators Digital: • PROFIBUS PA; SIMATIC PDM compatible	HART, SIMATIC PDM compatible
Power Specifications	Standard: • 12 ... 33 V DC Intrinsically Safe (Stainless steel version only): • 10 ... 30 V DC	Standard: • 12 ... 250 V AC/DC, 0 ... 60 Hz, 2 W max. Digital: • Bus voltage: 12 ... 30 V DC, IS version 12 ... 24 V DC • Current consumption: 12.5 mA	Standard: • 12 ... 250 V AC/DC, 0 ... 60 Hz, 2 W max. Digital: • Bus voltage: 12 ... 30 V DC, IS version 12 ... 24 V DC • Current consumption: 12.5 mA	• 12 ... 33 V DC • 3.6 ... 22 mA/ 22 ... 3.6 mA (2-wire current loop)
Approvals	Stainless steel cable or enclosure version: CE, CSA, FM, ATEX, RCM, Lloyds Register, WHG Fully-synthetic version (PPS): CSA, FM	CSA, FM, CE, ATEX, RCM, Lloyds Register, WHG, Vlare II	CSA, FM, CE, ATEX, RCM, Lloyds Register, WHG, Vlare II	CE, CSA, FM, ATEX, RCM, Lloyds Register, Bureau Veritas, Current Signaling according to NAMUR NE 43

Application

SIEMENS

Capacitance Application Questionnaire

Customer information

Contact: _____ Prepared By: _____
 Company: _____ Date: _____
 Address: _____ Notes on the Application: _____
 City: _____ Country: _____
 Zip/Postal Code: _____ Phone: () _____
 E-mail: _____ Fax: () _____

Tank/Vessel Information

(Supply sketch where possible) Sketch attached

Type: Storage
 Process
 Separator
 FPSO
 (Floating Processing
 Storage and Offloading)

Tank construction:
 Metallic Non-metallic
 Agitated top, bottom or side

Pressure:
 Normal: _____
 Maximum (relief): _____

Dimensions:
 Height: _____ m/ft
 Width/Diameter: _____ m/ft

Tank top: Open **Tank bottom:** Sloped **Mounting:** Top Mount
 Flat Flat Side Mount
 Conical Conical Pipe Mount
 Parabolic Parabolic

Critical Information

Nozzle Length: _____ cm/inch
Nozzle Diameter: _____ cm/inch

Process Data

Material being measured: _____ Liquid Solid Slurry

Material temperature: Norm: _____ °C/°F Max: _____ °C/°F

Measurement type: Point level
 Continuous level
 Interface level

Constant dielectric: No Yes DK Value _____

Upper material: _____ DK Value _____

Lower material: _____ DK Value _____

Process pressure: _____ Min. _____ Max. **Atmospheric steam:** No Yes

Coating build-up: No Yes **Conductive material:** No Yes _____ DK Value

Installation

(indicate all that apply)

Power available: _____

Outputs required:

4 ... 20 mA Relay Solid state

Communications

HART / 4 ... 20 mA PROFIBUS PA

Products recommended:

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS100

Overview



Pointek CLS100 is a compact 2-wire inverse frequency shift capacitance switch for level and material detection in constricted spaces, interfaces, solids, liquids, slurries and foam, with the ability to tune out build-up on probe.

Benefits

- Easy installation with verification by built-in LED
- Low maintenance with no moving parts
- Sensitivity adjustment
- Integrated cable or PBT enclosure versions available
- Intrinsically Safe, Dust Ignition Proof, and General Purpose options available

Application

Pointek CLS100's short insertion length of 100 mm (4 inch) and versatility in various applications and in vessels or pipes makes it a good replacement for traditional capacitance sensors.

Its advanced tip-sensing technology provides accurate, repeatable switchpoint performance. The PPS (Polyphenylene sulfide) probe [optional PVDF (Polyvinylidene Fluoride)] is chemically resistant with an effective process operating temperature range from -30 to +100 °C (-22 to +212 °F) (7ML5501), and -10 to +100 °C (14 to 212 °F) (7ML5610). The fully potted design ensures reliability in a vibrating environment such as agitated tanks up to 4 g. When used with a SensGuard protection cover, the CLS100 is protected from shearing, impact, and abrasion in tough primary processes.

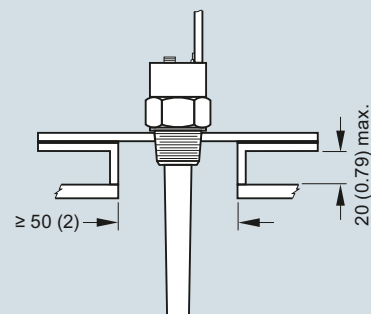
The Pointek CLS100 is available in three versions. The integral cable version has a stainless steel process connection and probe options of PPS or PVDF. The fully synthetic version has a thermoplastic polyester enclosure with a PPS process connection combined with a PPS probe. The standard enclosure version has a thermoplastic polyester enclosure with a stainless steel process connection in combination with a PPS or PVDF probe.

- Key Applications: liquids, slurries, powders, granules, food and pharmaceuticals, chemicals, hazardous areas

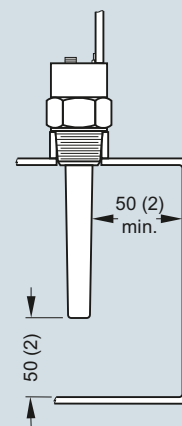
Configuration

Installation

Standpipes



Wall restriction



Pointek CLS100 installation, dimensions in mm (inch)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS100

Technical specifications

	Stainless steel process connection (integral cable or enclosure version) (7ML5501)	Fully synthetic process connection (enclosure version only) (7ML5610)
Mode of operation		
Measuring principle	Inverse frequency shift capacitive level detection	Inverse frequency shift capacitive level detection
Input		
Measured variable	Change in picroFarad (pF)	Change in picroFarad (pF)
Output		
Output signal		
• Alarm output	4 ... 20/20 ... 4 mA 2-wire loop	4 ... 20/20 ... 4 mA 2-wire loop
• Switch output ¹⁾	Solid-state: 30 V DC/30 V AC, max. 82 mA	Max. switching voltage: 60 V DC/30 V AC Max. switching current: 1 A
• Fail-safe mode	Min. or max.	Min. or max.
Accuracy		
Repeatability	2 mm (0.08 inch)	2 mm (0.08 inch)
Rated operating conditions²⁾		
Installation conditions		
• Location	Indoor/outdoor	Indoor/outdoor
Ambient conditions		
• Ambient temperature	-30 ... +85 °C (-22 ... +185 °F)	-10 ... +85 °C (14 ... 185 °F)
• Installation category	I	I
• Pollution degree	4	4
Medium conditions		
• Relative dielectric constant ϵ_r	Min. 1.5	Min. 1.5
• Process temperature	-30 ... +100 °C (-22 ... +212 °F)	-10 ... +100 °C (14 ... 212 °F)
• Pressure (vessel)	-1 ... +10 bar g (-14.6 ... +146 psi g), nominal ²⁾	-1 ... +10 bar g (-14.6 ... +146 psi g), nominal
• Degree of protection		
- Enclosure version	IP68/Type 4/NEMA 4	IP68/Type 4/NEMA 4
- Integral cable version	IP65/Type 4/NEMA 4	Not applicable
• Cable inlet	½" NPT (M20x1.5 optional)	½" NPT (M20x1.5 optional)
Design		
	<u>Enclosure/Integral cable version</u>	<u>Fully synthetic version</u>
Material		
• Body (Enclosure version)	Thermoplastic polyester	Thermoplastic polyester
• Lid (Enclosure version)	Transparent thermoplastic polycarbonate (PC)	Transparent thermoplastic polycarbonate (PC)
• Integrated cable body (Integral cable version)	316L stainless steel	Not applicable

	Stainless steel process connection (integral cable or enclosure version) (7ML5501)	Fully synthetic process connection (enclosure version only) (7ML5610)
Sensor length (nominal)	100 mm (4 inch)	100 mm (4 inch)
Process connection material of probe/wetted parts ³⁾	Connection: 316L stainless steel; Process seal: FKM (optional FFKM); Sensor: PPS (optional PVDF) ⁴⁾	PPS process connection and PPS sensor (Uni-Construction)
Connection (Enclosure version)	Internal 5-point terminal block, ½" NPT wiring entrance, M20x1.5 optional	Removable internal 5-point terminal block, ½" NPT wiring entrance, M20 x 1.5 optional
Connection (Integral cable version)	4 conductors, 1 m (3.3 ft), 0.5 mm ² (22 AWG), shielded, polyester jacket	Not applicable
Process connection	¾" NPT [(Taper), ANSI/ASME B1.20.1] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	¾" NPT [(Taper), ANSI/ASME B1.20.1] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]
Power supply		
• Standard	12 ... 33 V DC	12 ... 33 V DC
• Intrinsically Safe	10 ... 30 V DC (Intrinsically Safe barrier required)	Not applicable
Certificates and approvals		
	<ul style="list-style-type: none"> • General: CE, CSA, FM, RCM • Marine: Lloyds Register of Shipping, categories ENV1, ENV2, and ENV5 • Dust Ignition Proof (barrier required): CSA/FM Class II and III, Div. 1, Groups E, F, G T4 • Intrinsically Safe (barrier required): CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G T4 • ATEX II 1 GD 1/2GD EEx ia IIC T4 to T6 T107 °C • Overfill protection: WHG (Germany) 	<ul style="list-style-type: none"> • General: CSA, FM

¹⁾ When synthetic process connection version (7ML5610) is used in wet locations, switching voltage of the relay is limited to 35 V DC/16 V AC.

²⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves on page 4/16.

³⁾ For Caustic Materials please contact ceg.smpi@siemens.com <http://www.siemens.com/automation/support-request> for alternative O Rings

⁴⁾ When FFKM O-ring (Option A22) is selected, process temperature is restricted to -20 °C (-4 °F).

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS100

Selection and Ordering data	Article No.
Pointek CLS100, stainless steel process connection Compact 2-wire inverse frequency shift capacitance switch for level and material detection in constricted spaces, interfaces, solids, liquids, slurries and foam, with the ability to tune out build-up on probe. Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5501-0
Process connection ¾" NPT [(Taper), ANSI/ASME B1.20.1] A R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] E G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] J	
Approvals General Purpose: CE, CSA, FM, RCM A CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G T4; ATEX II 1 GD 1/2GD EEx ia IIC T4 to T6 T107 °C ¹⁾ C CSA/FM Class II and III, Div. 1, Groups E, F, G ¹⁾ G	
Device version Integral cable version (PPS probe) 1 Enclosure version (PPS probe), ½" NPT cable inlet 3 Integral cable version with PVDF probe body 5 Enclosure version with PVDF probe body (½" NPT cable inlet) 6 Enclosure version (PPS probe), M20 x 1.5 cable inlet 7 Enclosure version with PVDF probe body, M20 x 1.5 cable inlet 8	
Overfill protection Not required 0 Required 1	

¹⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 20 characters) specify in plain text Y17	
FFKM seal O-ring ¹⁾ A22	
Inspection Certificate Type 3.1 per EN 10204 C12	

Operating Instructions

Quick start manual, multi-language
 Article No. **A5E32146158**
 Note: due to ATEX regulations one Quick start manual is included with every product.
 This device is shipped with the Siemens Milltronics manual DVD containing ATEX Quick Starts and Operating Instructions.

¹⁾ See Temperature restriction on page 4/16

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.
Accessories	
SensGuard, ¾" NPT (PPS) Only available for CLS100 with ¾" NPT thread	7ML1830-1DL
SensGuard, R 1" (BSPT) (PPS) Only available for CLS100 with ¾" NPT thread	7ML1830-1DM
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosures	7ML1930-1AC
Siemens Intrinsically Safe Barrier (DC powered), ATEX II 1 G EEx ia	7NG4124-0AA00
½" NPT cable gland, nickel plated brass, fits cable diameter 6 ... 12 mm (0.24 ... 0.47 inch) -40 ... +100 °C (-40 ... +212 °F), IP68 (General Purpose)	7ML1830-1JA
M20 x 1.5 cable gland, PA polyamide, ATEX II 2G EEx e II, fits cable diameter 7 ... 12 mm (0.28 ... 0.47 inch), -20 ... +70 °C (-4 ... +158 °F), IP68 (General Purpose)	7ML1830-1JC

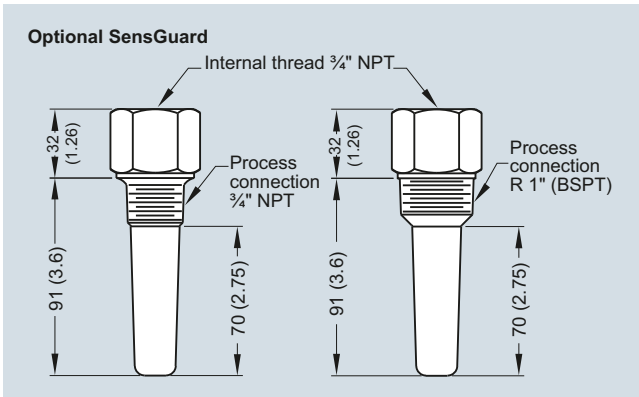
Selection and Ordering data	Article No.
Pointek CLS100, PPS process connection Compact 2-wire inverse frequency shift capacitance switch for level and material detection in constricted spaces, interfaces, solids, liquids, slurries and foam, with the ability to tune out build-up on foam. Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5610-0
Process connection (PPS) ¾" NPT [(Taper), ANSI/ASME B1.20.1] (PPS probe body) A R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] (PPS probe body) B	
Approvals General Purpose: CSA, FM D	
Versions/Options Enclosure version, PPS process connection, ½" NPT cable inlet 1 Enclosure version, PPS process connection, M20 x 1.5 2	
Overfill protection Not required 0 Required 1	

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 20 characters) specify in plain text Y17	
FFKM seal O-ring ¹⁾ A22	
Inspection Certificate Type 3.1 per EN 10204 C12	
Operating Instructions	Article No. A5E32146158
Quick start manual, multi-language Note: due to ATEX regulations one Quick start manual is included with every product. This device is shipped with the Siemens Milltronics manual DVD containing ATEX Quick Starts and Operating Instructions.	
Accessories SensGuard, ¾" NPT (PPS) Only available for CLS100 with ¾" NPT thread SensGuard, R 1" (BSPT) (PPS) Only available for CLS100 with ¾" NPT thread Tag, stainless steel, 12 x 45 mm, (0.47 x 1.77 inch) one text line, suitable for enclosures	7ML1830-1DL 7ML1830-1DM 7ML1930-1AC

¹⁾ See Temperature restriction on page 4/16

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Options



Optional SensGuard, dimensions in mm (inch)

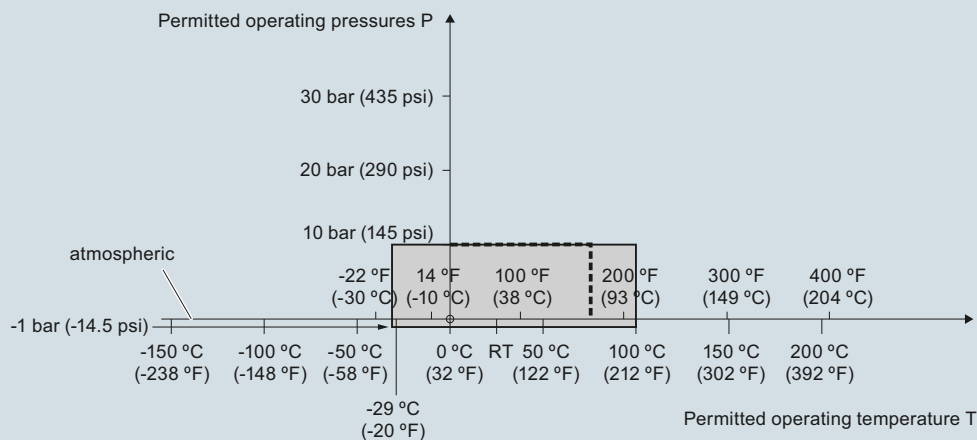
Level Measurement

Point level measurement – Capacitance switches

Pointek CLS100

Characteristic curves

Pressure/temperature curve
CLS100
Threaded process connections
(7ML5501)

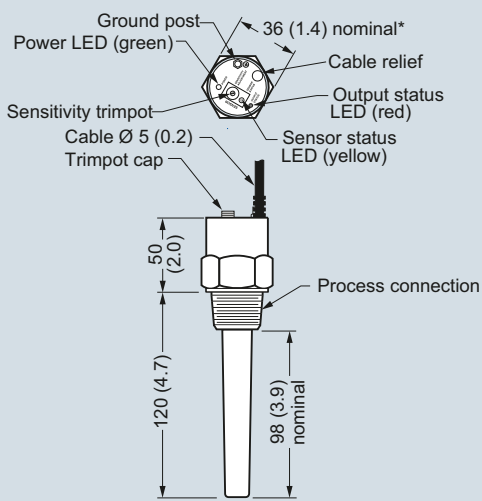


--- Example:
Permitted operating pressure = 10 bar (145 psi) at 75 °C

Pointek CLS100 Process Pressure/Temperature derating curves

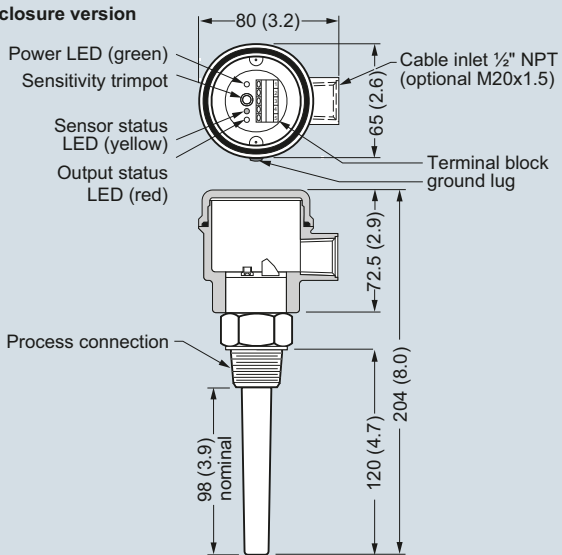
Dimensional drawings

Integral cable version



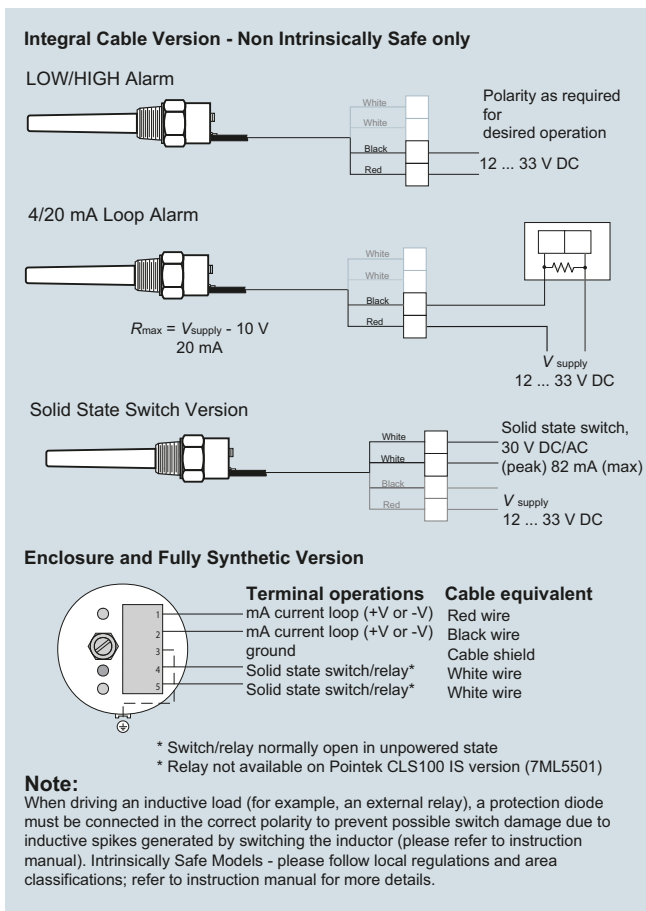
*Some G thread configurations deviate from this size.

Enclosure version



Pointek CLS100, dimensions in mm (inch)

Schematics



Pointek CLS100 connections

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard

Overview



Pointek CLS200 (standard version) is a versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam and interfaces and has the ability to tune out build-up on the probe.

Benefits

- Potted construction protects signal circuit from shock, vibration, humidity and/or condensation
- High chemical resistance
- Level detection independent of tank or pipe earth reference
- Insensitive to product buildup due to high frequency oscillation
- 3 LED indicators for sensor status, output status, and power

Application

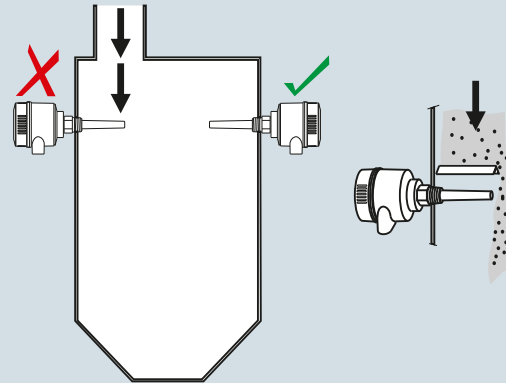
Pointek CLS200 standard version has 3 LED indicators with basic relay and solid-state switch alarms. Universal switch for solids/liquids and interface.

The power supply is galvanically isolated and accepts a wide range of voltages (12 to 250 V AC/DC). When used with thermal isolator, the stainless steel and PPS (PVDF optional) materials used in the probe construction provide a temperature rating up to 125 °C (257 °F) on the process wetted portion of the probe. The switch responds to any material with a dielectric constant of 1.5 or more by detecting a change in oscillating frequency, and it can be set to detect before contact or on contact with the probe. The CLS200 operates independently of the tank wall or pipe so it does not require an external reference electrode for level detection in a non-conductive vessel such as concrete or plastic (EMC regulations applicable in some regions).

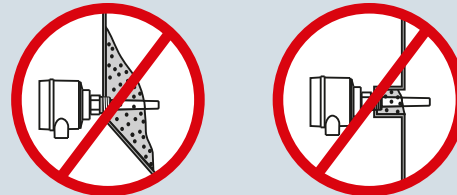
- Key Applications: liquids, slurries, powders, granules, pressurized applications, hazardous areas

Configuration

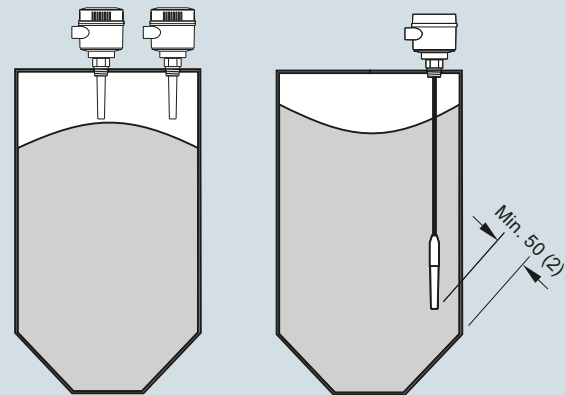
Installation



Keep unit out of path of falling material, or protect probe from falling material.



Avoid areas where material build up occurs.



Install probe at least 50 (2) from tank wall.

Pointek CLS200 installation, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	Inverse frequency shift capacitive level detection
Input	
Measured variable	Change in picoFarad (pF)
Output	
Output signal	
• Relay output	1 SPDT Form C relay
- Max. contact voltage	• 30 V DC • 250 V AC
- Max. contact current	• 5 A DC • 8 A AC
- Max. switching capacity	150 W DC 2 000 VA AC
- Time delay (ON and/or OFF)	1 ... 60 s
• Solid-state output	
- Output	Galvanically isolated
- Protection	Against reversed polarity (bipolar)
- Max. switching voltage	• 30 V DC • 30 V peak AC
- Max. load current	82 mA
- Voltage drop	< 1 V, typical at 50 mA
- Time delay (pre or post switching)	1 ... 60 s
Rated operating conditions¹⁾	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +85 °C (-40 ... +185 °F) ²⁾
• Installation category	II
• Pollution degree	4
Medium conditions	Liquids, bulk solids, slurries and interfaces
• Relative dielectric constant ϵ_r	Min. 1.5
• Process temperature	
- Without thermal isolator	-40 ... +85 °C (-40 ... +185 °F) ²⁾
- With thermal isolator	-40 ... +125 °C (-40 ... +257 °F)
• Process pressure (rod version)	-1 ... +25 bar g (-14.6 ... +365 psi g) (nominal)
• Process pressure (cable version) ³⁾	-1 ... +10 bar g (-14.6 ... +150 psi g) (nominal)
• Process pressure (sliding coupling version)	-1 ... +10 bar g (-14.6 ... +150 psi g) (nominal)
Electromagnetic Compatibility	To comply with CE EMC regulations (where applicable); the CLS200 should be installed per the instruction manual.

Design

Material	Epoxy-coated aluminum with gasket
• Enclosure	316L stainless steel
• Optional thermal isolator	Removable terminal block, max. 2.5 mm ²
Connection	IP65/Type 4/NEMA 4 (optional IP68)
Degree of protection	2 x M20x1.5 thread (option: 2 x 1/2" NPT conduit entry including 1 plugged entry)
Cable inlet	

Power supply

12 ... 250 V AC/DC, 0 ... 60 Hz
max. 2 W

Certificates and approvals

General Purpose	CSA, FM, CE, RCM
Dust Ignition Proof	ATEX II 1/2 D T100 °C
Flameproof Enclosure With IS Probe	ATEX II 1 G EEx d[ia] IIC T6...T4 ATEX II 1/2 D T100 °C
Dust Ignition Proof with IS Probe	CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Explosion Proof Enclosure With IS Probe	CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Marine	Lloyds Register of Shipping, Categories ENV1, ENV2 and ENV5
Overfill Protection	WHG (Germany) VLAREM II
Others	Pattern Approval (China)

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves on page 4/37.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F)

³⁾ Pressure rating of process seal is temperature dependent. See Pressure/Temperature curves on page 4/37.

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard

Design: Probe				
	Rod version	Sanitary version	Cable version	Sliding Coupling version
Max. length	5 500 mm (216.53 inch)	5 500 mm (216.53 inch)	30 000 mm (1 181.1 inch) liquids and slurries 5 000 mm (196.85 inch) solids (under loads)	5 500 mm (216.53 inch)
Process connection	R ¾", 1", 1¼", 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ¾", 1", 1¼", 1½" NPT [(Taper), ANSI/ASME B1.20.1] G ¾", 1", 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] 316L stainless steel ASME/EN flange	1½", 2" sanitary fitting clamp 316L stainless steel	R ¾", 1", 1¼", 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ¾", 1", 1¼", 1½" NPT [(Taper), ANSI/ASME B1.20.1] G ¾", 1", 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] 316L stainless steel ASME/EN flange	R ¾", 1", 1¼", 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ¾", 1", 1¼", 1½" NPT [(Taper), ANSI/ASME B1.20.1] G ¾", 1", 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]
Extension material	316L stainless steel optional PFA coated ¹⁾	316L stainless steel	Fluoroethylene propylene (FEP) cable with stainless steel core	316L stainless steel
Sensor wetted parts	PPS (optional PVDF)	PPS (optional PVDF)	PPS (optional PVDF)	PPS (optional PVDF)
O-ring seal material	FKM (optional FFKM) ²⁾	FKM (optional FFKM) ²⁾	FKM (optional FFKM) ²⁾	FKM (optional FFKM) ²⁾
Thermal isolator ³⁾	Optional	Optional	Optional	Optional
Extension	User selected length	User selected length	Cable extension	User selected length

¹⁾ PFA coating (7ML5634 and 7ML5644) has 120 micron thickness.

²⁾ For Caustic Materials please contact ceg.smpi@siemens.com for alternative O-Rings


³⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F).

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Pointek CLS200 - Standard - Rod Version with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5630- 	Pointek CLS200 - Standard - Rod Version with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe. Add Order code Y01 and plain text: "Insertion length ... mm"	7ML5630-
Process connection Threaded, 316L stainless steel ¾" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 A 1" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 B 1¼" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 C 1½" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 D R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 A R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 B R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 D G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 A G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 B G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 D		Extended rod, 210 ... 1 000 mm (8.27 ... 39.37 inch) ● M Extended rod, 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ● N Extended rod, 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ● P Extended rod, 3 001 ... 4 000 mm (118.15 ... 157.48 inch) ● Q Extended rod, 4 001 ... 5 000 mm (157.52 ... 196.85 inch) ● R Extended rod, 5 001 ... 5 500 mm (196.89 ... 216.53 inch) ● S	
Welded flange, 316L stainless steel, raised face 1" ASME, 150 lb ● 5 A 1" ASME, 300 lb ● 5 B 1" ASME, 600 lb ● 5 C 1½" ASME, 150 lb ● 5 D 1½" ASME, 300 lb ● 5 E 1½" ASME, 600 lb ● 5 F 2" ASME, 150 lb ● 5 G 2" ASME, 300 lb ● 5 H 2" ASME, 600 lb ● 5 J 3" ASME, 150 lb ● 5 K 3" ASME, 300 lb ● 5 L 3" ASME, 600 lb ● 5 M 4" ASME, 150 lb ● 5 N 4" ASME, 300 lb ● 5 P 4" ASME, 600 lb ● 5 Q		Thermal isolator Without thermal isolator ● 0 With thermal isolator [for process connection temperatures over 85 °C (185 °F)] ● 1	
Welded flange, 316L stainless steel, Type A flat faced DN 25, PN 16 ● 6 A DN 25, PN 40 ● 6 B DN 40, PN 16 ● 6 C DN 40, PN 40 ● 6 D DN 50, PN 16 ● 6 E DN 50, PN 40 ● 6 F DN 80, PN 16 ● 6 G DN 80, PN 40 ● 6 H DN 100, PN 16 ● 6 J DN 100, PN 40 ● 6 K		Remote mount electronics and mounting bracket With 2 m (79 inch) of cable ¹⁾ ● 2 With 5 m (197 inch) of cable ¹⁾ ● 3	
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)		Wetted seals FKM ● 0 FFKM [for process temperatures above -20 °C (-4 °F)] ● 1	
Probe length (length from flange face) (threaded lengths include process thread) Note: No Y01 needed in Order code for standard lengths Compact [threaded 120 mm (4.72 inch), Flanged 98 mm (3.86 inch)] ● A Extended rod, 250 mm (9.84 inch) ● B Extended rod, 350 mm (13.78 inch) ● C Extended rod, 500 mm (19.69 inch) ● D Extended rod, 750 mm (29.53 inch) ● E Extended rod, 1 000 mm (39.37 inch) ● F Extended rod, 1 250 mm (49.21 inch) ● G Extended rod, 1 350 mm (53.15 inch) ● H Extended rod, 1 500 mm (59.06 inch) ● J Extended rod, 1 750 mm (68.90 inch) ● K Extended rod, 2 000 mm (78.74 inch) ● L		Probe material 316L stainless steel with PPS probe body ● 0 316L stainless steel with PVDF probe body ● 1	
		Approvals Dust Ignition Proof: CE, RCM, ATEX II 1/2 D T100 °C ● C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1 G EEx d[ia] IIC T6 ... T4, ATEX II 1/2 D T100 °C ● D Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6 ... T4, ATEX II 1/2 D T100 °C ● E Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 ● F Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 ● G General Purpose (CSA, FM) ● H General Purpose (CE, RCM) ● J General Purpose (CSA, FM, CE, RCM) with WHG approval ● K	
		Enclosure and lid Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 ● A 2 x M20 x 1.5 cable inlet IP65 ● B 2 x ½" NPT via adapter - cable inlet, IP68 ● C 2 x M20 x 1.5 cable inlet IP68 ● D	
		¹⁾ Available with Approvals options F ... H ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs		Pointek CLS200 - Standard - Cable Version with Threaded or Flanged process connection	7ML5631-
Please add "-Z" to Article No. and specify Order code(s).		Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	0
Total insertion length: enter the total insertion length in plain text description	Y01	➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15	Process connection	
Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000	C11	Threaded, 316L stainless steel	
Inspection Certificate Type 3.1 per EN 10204	C12	3/4" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
Operating Instructions	See page 4/36	1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.		1 1/4" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
Accessories	See page 4/36	1 1/2" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.		R 3/4" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
		R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
		R 1 1/2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
		G 3/4" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
		G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
		G 1 1/2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
		Welded flange, 316L stainless steel, raised face	
		1" ASME, 150 lb	5 A
		1" ASME, 300 lb	5 B
		1" ASME, 600 lb	5 C
		1 1/2" ASME, 150 lb	5 D
		1 1/2" ASME, 300 lb	5 E
		1 1/2" ASME, 600 lb	5 F
		2" ASME, 150 lb	5 G
		2" ASME, 300 lb	5 H
		2" ASME, 600 lb	5 J
		3" ASME, 150 lb	5 K
		3" ASME, 300 lb	5 L
		3" ASME, 600 lb	5 M
		4" ASME, 150 lb	5 N
		4" ASME, 300 lb	5 P
		4" ASME, 600 lb	5 Q
		Welded flange, 316L stainless steel, Type A flat faced	
		DN 25, PN 16	6 A
		DN 25, PN 40	6 B
		DN 40, PN 16	6 C
		DN 40, PN 40	6 D
		DN 50, PN 16	6 E
		DN 50, PN 40	6 F
		DN 80, PN 16	6 G
		DN 80, PN 40	6 H
		DN 100, PN 16	6 J
		DN 100, PN 40	6 K
		(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
		Probe length (length from flange face) (threaded lengths include process thread)	
		Note: No Y01 needed in Order code for standard lengths	
		Extended cable, 3 000 mm (118.11 inch), length can be determined by customer on assembly ¹⁾	A
		Extended cable, 6 000 mm (236.22 inch), length can be determined by customer on assembly ¹⁾	B
		Add Order code Y01 and plain text: "Insertion length ... mm"	
		Extended cable, 500 ... 5 000 mm (19.69 ... 196.85 inch)	C
		Extended cable, 5 001 ... 10 000 mm (196.89 ... 393.70 inch)	D
		Extended cable, 10 001 ... 15 000 mm (393.74 ... 590.55 inch)	E
		Extended cable, 15 001 ... 20 000 mm (590.59 ... 787.4 inch)	F
		Extended cable, 20 001 ... 25 000 mm (787.44 ... 984.25 inch)	G
		Extended cable, 25 001 ... 30 000 mm (984.29 ... 1 181.1 inch)	H

Selection and Ordering data	Article No.
Pointek CLS200 - Standard - Cable Version with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5631- 0
Thermal isolator	
Without thermal isolator	0
With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	1
Remote mount electronics and mounting bracket	
With 2 m (79 inch) of cable ²⁾	2
With 5 m (197 inch) of cable ²⁾	3
Wetted seals	
FKM and PTFE	0
FFKM and PTFE [for process temperatures above -20 °C (-4 °F)]	1
Probe material	
FEP jacketed cable with PPS probe body	0
FEP jacketed cable with PVDF probe body	1
Approvals	
Dust Ignition Proof: CE, RCM, ATEX II 1/2 D T100 °C	C
Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	D
Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	E
Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	F
Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	G
General Purpose (CSA, FM)	H
General Purpose (CE, RCM)	J
General Purpose (CSA, FM, CE, RCM) with WHG approval	K
Enclosure and lid	
Aluminum epoxy coated	
2 x 1/2" NPT via adapter - cable inlet, IP65	A
2 x M20 x1.5 cable inlet, IP65	B
2 x 1/2" NPT via adapter - cable inlet, IP68	C
2 x M20 x1.5 cable inlet, IP68	D

1) Sensor detached to allow customer to set desired cable length

2) Available with Approvals options F ... H

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.


Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	◆ Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	◆ Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000	◆ C11
Inspection Certificate Type 3.1 per EN 10204	◆ C12
Operating Instructions	
Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Accessories	See page 4/36


◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard

Selection and Ordering data	Article No.
Pointek CLS200 - Standard - Rod with Sanitary process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5632-  0
Process connection Sanitary 316L stainless steel 1" sanitary fitting clamp 1½" sanitary fitting clamp 2" sanitary fitting clamp 2½" sanitary fitting clamp 3" sanitary fitting clamp (Note: Sanitary connection dimensionally corresponds to the applicable ISO 2852 standard)	8 A 8 B 8 C 8 D 8 E
Probe length (length from process connection face) Note: No Y01 needed in Order code for standard lengths Compact 98 mm (3.86 inch) Extended rod, 250 mm (9.84 inch) Extended rod, 350 mm (13.78 inch) Extended rod, 500 mm (19.69 inch) Extended rod, 750 mm (29.53 inch) Extended rod, 1 000 mm (39.37 inch) Extended rod, 1 250 mm (49.21 inch) Extended rod, 1 350 mm (53.15 inch) Extended rod, 1 500 mm (59.06 inch) Extended rod, 1 750 mm (68.90 inch) Extended rod, 2 000 mm (78.74 inch) Add Order code Y01 and plain text: "Insertion length ... mm" Extended rod, 1 10 ... 350 mm (4.3 ... 13.78 inch) Extended rod, 351 ... 1 000 mm (13.78 ... 39.37 inch) Extended rod, 1 001 ... 2 000 mm (39.41 ... 78.74 inch) Extended rod, 2 001 ... 3 000 mm (78.78 ... 118.11 inch) Extended rod, 3 001 ... 4 000 mm (118.15 ... 157.48 inch) Extended rod, 4 001 ... 5 000 mm (157.52 ... 196.85 inch) Extended rod, 5 001 ... 5 500 mm (196.89 ... 216.53 inch)	A B C D E F G H J K L M N P Q R S T
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1
Remote mount electronics and mounting bracket Remote mount electronics with 2 m (79 inch) of cable ¹⁾ Remote mount electronics with 5 m (197 inch) of cable ¹⁾	2 3
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1
Probe material 316L stainless steel with PPS probe body 316L stainless steel with PVDF probe body	0 1

Selection and Ordering data	Article No.
Pointek CLS200 - Standard - Rod with Sanitary process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5632-  0
Approvals Dust Ignition Proof: CE, RCM, ATEX II 1/2 D T100 °C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1 G EEx d[ia] IIC T6 ... T4, ATEX II 1/2 D T100 °C Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6 ... T4, ATEX II 1/2 D T100 °C Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM) General Purpose (CE, RCM) General Purpose (CSA, FM, CE, RCM) with WHG approval	C D E F G H J K
Enclosure and lid Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D

¹⁾ Available with Approvals options F ... H

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000 Inspection Certificate Type 3.1 per EN 10204	Y01 Y15 C11 C12
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Accessories	See page 4/36

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.


Selection and Ordering data	Article No.
Pointek CLS200 - Standard - Sliding Coupling with Threaded process connection	7ML5633-
Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection	
Threaded, 316L stainless steel	
3/4" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
1 1/4" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
1 1/2" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
R 3/4" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
R 1 1/2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
G 3/4" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
G 1 1/2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
Probe length (length from flange face) (threaded lengths include process thread)	
Note: No Y01 needed in Order code for standard lengths	
Extended rod, 350 mm (13.78 inch)	C
Extended rod, 500 mm (19.69 inch)	D
Extended rod, 750 mm (29.53 inch)	E
Extended rod, 1 000 mm (39.37 inch)	F
Extended rod, 1 250 mm (49.21 inch)	G
Extended rod, 1 350 mm (53.15 inch)	H
Extended rod, 1 500 mm (59.06 inch)	J
Extended rod, 1 750 mm (68.90 inch)	K
Extended rod, 2 000 mm (78.74 inch)	L
Add Order code Y01 and plain text: "Insertion length ... mm"	
Extended rod, 350 ... 1 000 mm (13.78 ... 39.37 inch)	M
Extended rod, 1 001 ... 2 000 mm (39.41 ... 78.74 inch)	N
Extended rod, 2 001 ... 3 000 mm (78.78 ... 118.11 inch)	P
Extended rod, 3 001 ... 4 000 mm (118.15 ... 157.48 inch)	Q
Extended rod, 4 001 ... 5 000 mm (157.52 ... 196.85 inch)	R
Extended rod, 5 001 ... 5 500 mm (196.89 ... 216.53 inch)	S
Thermal isolator	
Without thermal isolator	0
With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	1
Remote mount electronics and mounting bracket	
With 2 m (79 inch) of cable ¹⁾	2
With 5 m (197 inch) of cable ¹⁾	3
Wetted seals	
FKM and PTFE	0
FFKM and PTFE [for process temperatures above -20 °C (-4 °F)]	1
Probe material	
316L stainless steel with PPS probe body	0
316L stainless steel with PVDF probe body	1


Selection and Ordering data	Article No.
Pointek CLS200 - Standard - Sliding Coupling with Threaded process connection	7ML5633-
Versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	
Approvals	
Dust Ignition Proof: CE, RCM, ATEX II 1/2 D T100 °C	C
Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	D
Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	E
Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	F
Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	G
General Purpose (CSA, FM)	H
General Purpose (CE, RCM)	J
General Purpose (CSA, FM, CE, RCM) with WHG approval	K
Enclosure and lid	
Aluminum epoxy coated	
2 x 1/2" NPT via adapter - cable inlet, IP65	A
2 x M20x1.5 cable inlet, IP65	B
2 x 1/2" NPT via adapter - cable inlet, IP68	C
2 x M20x1.5 cable inlet, IP68	D
1) Available with Approvals options F ... H	
➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.	
Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	
Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Accessories	
➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.	See page 4/36

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard

Selection and Ordering data	Article No.
Pointek CLS200 - Standard - PFA Coated Rod with PFA Coated Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/ cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5634- 
Process connection Welded flange, 316L stainless steel, raised face 1" ASME, 150 lb 1" ASME, 300 lb 1" ASME, 600 lb 1½" ASME, 150 lb 1½" ASME, 300 lb 1½" ASME, 600 lb 2" ASME, 150 lb 2" ASME, 300 lb 2" ASME, 600 lb 3" ASME, 150 lb 3" ASME, 300 lb 3" ASME, 600 lb 4" ASME, 150 lb 4" ASME, 300 lb 4" ASME, 600 lb	5 A 5 B 5 C 5 D 5 E 5 F 5 G 5 H 5 J 5 K 5 L 5 M 5 N 5 P 5 Q
Welded flange, 316L stainless steel, Type A flat faced DN 25, PN 16 DN 25, PN 40 DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 DN 100, PN 16 DN 100, PN 40 (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	6 A 6 B 6 C 6 D 6 E 6 F 6 G 6 H 6 J 6 K
Probe length (length from flange face) (threaded lengths include process thread) Note: No Y01 needed in Order code for standard lengths Compact 98 mm (3.86 inch) Extended rod, 250 mm (9.84 inch) Extended rod, 350 mm (13.78 inch) Extended rod, 500 mm (19.69 inch) Extended rod, 750 mm (29.53 inch) Extended rod, 1 000 mm (39.37 inch) Extended rod, 1 250 mm (49.21 inch) Extended rod, 1 350 mm (53.15 inch) Extended rod, 1 500 mm (59.06 inch) Extended rod, 1 750 mm (68.90 inch) Extended rod, 2 000 mm (78.74 inch) Add Order code Y01 and plain text: "Insertion length ... mm" Extended rod, 200 ... 1 000 mm (7.87 ... 39.37 inch) Extended rod, 1 001 ... 2 000 mm (39.41 ... 78.74 inch) Extended rod, 2 001 ... 3 000 mm (78.78 ... 118.11 inch) Extended rod, 3 001 ... 4 000 mm (118.15 ... 157.48 inch) Extended rod, 4 001 ... 5 000 mm (157.52 ... 196.85 inch) Extended rod, 5 001 ... 5 500 mm (196.89 ... 216.53 inch)	A B C D E F G H J K L M N P Q R S

Selection and Ordering data	Article No.
Pointek CLS200 - Standard - PFA Coated Rod with PFA Coated Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional rod/ cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5634- 
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1
Remote mount electronics and mounting bracket With 2 m (79 inch) of cable With 5 m (197 inch) of cable	2 3
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1
Probe material PFA Coated 316L stainless steel with PPS probe body PFA Coated 316L stainless steel with PVDF probe body	0 1
Approvals Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM)	F G H
Enclosure and lid Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D
Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]; Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000 Inspection Certificate Type 3.1 per EN 10204	Y01 Y15 C11 C12
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Accessories	See page 4/36

4

Overview



Pointek CLS200 (digital version) is a versatile inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam and interfaces and has the ability to tune out build-up on the probe. The digital version includes PROFIBUS PA, an LCD display, and advanced diagnostic features.

Benefits

- Potted construction protects signal circuit from shock, vibration, humidity and/or condensation
- High chemical resistance
- Level detection independent of tank or pipe earth reference
- Insensitive to product buildup due to high frequency oscillation
- High sensitivity allows installation in a wide range of liquids, solids or slurry applications
- Integral LCD display allows for easy menu-driven setup
- PROFIBUS PA communication (SIMATIC PDM compatible)

Application

Pointek CLS200 digital version provides an integral LCD display for stand-alone use, and also provides PROFIBUS PA communication (Profile version 3.0, Class B) for connection to a network.

The power supply is galvanically isolated and accepts a wide range of voltages (12 to 30 V DC). When used with thermal isolator, the stainless steel and PPS (PVDF optional) materials used in the probe construction provide a temperature rating up to 125 °C (257 °F) on the process wetted portion of the probe. The switch responds to any material with a dielectric constant of 1.5 or more by detecting a change in oscillating frequency, and it can be set to detect before contact or on contact with the probe. The menu-driven setup allows precise control of the switch point signal damping and alarm functions.

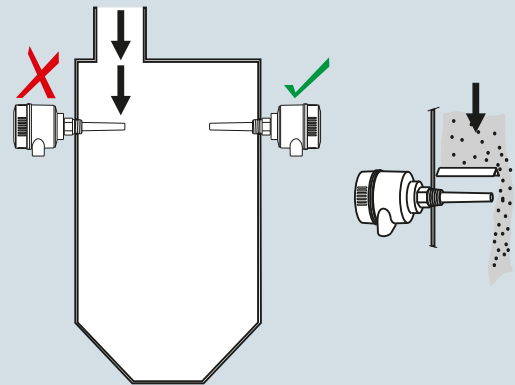
When connected to the PROFIBUS network, advanced diagnostics and set up using SIMATIC PDM are possible.

The CLS200 operates independently of the tank wall or pipe so it does not require an external reference electrode for level detection in a non-conductive vessel such as concrete or plastic (EMC regulations applicable in some regions).

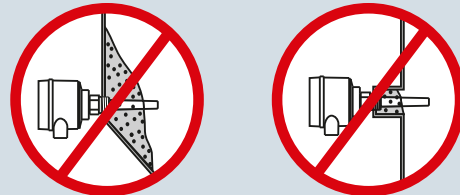
- Key Applications: liquids, slurries, powders, granules, pressurized applications, hazardous areas

Configuration

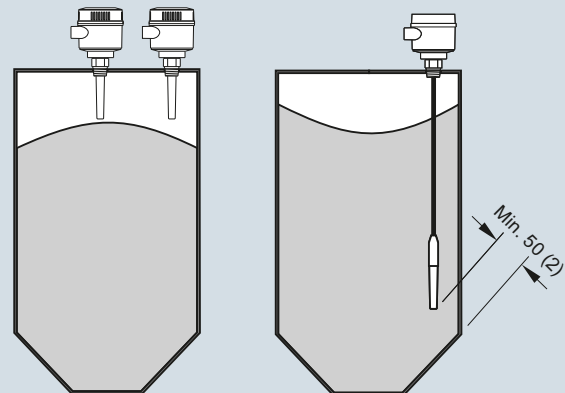
Installation



Keep unit out of path of falling material, or protect probe from falling material.



Avoid areas where material build up occurs.



Install probe at least 50 (2) from tank wall.

Pointek CLS200 installation, dimensions in mm (inch)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Digital

Technical specifications

Mode of operation	
Measuring principle	Inverse frequency shift capacitive level detection
Input	
Measured variable	Change in picoFarad (pF)
Output	
Output signal	
• Solid-state output	
- Output	Galvanically isolated
- Protection	Against reversed polarity (bipolar)
- Max. switching voltage	• 30 V (DC) • 30 V peak (AC)
- Max. load current	82 mA
- Voltage drop	< 1 V, typical at 50 mA
- Time delay (ON and/or OFF)	Programmable by user (0 ... 100 s)
• Fail-safe mode	Min. or max.
• Connection	Removable terminal block
Rated operating conditions¹⁾	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +85 °C (-40 ... +185 °F) ²⁾
• Installation category	II
• Pollution degree	4
Medium conditions	Liquids, bulk solids, slurries and interfaces
• Relative dielectric constant ϵ_r	Min. 1.5
• Process temperature	
- Without thermal isolator	-40 ... +85 °C (-40 ... +185 °F) ²⁾
- With thermal isolator	-40 ... +125 °C (-40 ... +257 °F)
• Process pressure (rod version)	-1 ... +25 bar g (-14.6 ... +365 psi g) (nominal)
• Process pressure (cable version) ³⁾	-1 ... +10 bar g (-14.6 ... +150 psi g) (nominal)
• Process pressure (sliding coupling version)	-1 ... +10 bar g (-14.6 ... +150 psi g) (nominal)
Design	
• Material	
- Enclosure	Epoxy-coated aluminum with gasket
- Optional thermal isolator	316L stainless steel
• Connection	Removable terminal block, max. 2.5 mm ²
• Degree of protection	IP65/Type 4/NEMA 4 (optional IP68)
• Cable inlet	2 x M20x1.5 thread (option: 2 x 1/2" NPT conduit entry including 1 plugged entry)
Electromagnetic Compatibility	To comply with CE EMC regulations (where applicable); the CLS200 should be installed per the instruction manual.

Power supply	
Bus voltage	Standard: 12 ... 30 V DC Intrinsically Safe: 12 ... 24 V DC
Current consumption	12.5 mA
Certificates and approvals	
General Purpose	CSA, FM, CE, RCM
Dust Ignition Proof	ATEX II 1/2 D T100 °C
Dust Ignition Proof with IS Probe	CSA/FM Class II, Div. 1, Groups E, F, G
Flameproof Enclosure with IS Probe	CSA/FM Class III T4 ATEX II 1/2 G EEx d[ia] IIC T6...T4 ATEX II 1/2 D T100 °C
Explosion Proof with IS Probe	CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Intrinsically Safe ⁴⁾	ATEX II 1 G EEx ia IIC T6 ... T4 ATEX II 1/2 D IP6X T100 °C CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Non-incendive	CSA/FM Class I, Div. 2, Groups A, B, C, D CSA/FM Class II, Div. 2, Groups F, G CSA/FM Class III T4 or T6
Non-Sparking	ATEX II 3 G Ex nA II T6...T4 ATEX II 2 D IP6X T100 °C
Marine	Lloyds Register of Shipping, Categories ENV1, ENV2 and ENV5
Others	Pattern Approval (China)
Communication	
	PROFIBUS PA (IEC 61158 CPF3 CP3/2) Bus physical layer: IEC 61158-2 MBP (IS) Device profile: PROFIBUS PA profile for Process Control Devices Version 3.0, Class B FISCO field device

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate.
See also Pressure/Temperature curves on page 4/37.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F)

³⁾ Pressure rating of process seal is temperature dependent.
See Pressure/Temperature curves on page 4/37.

⁴⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Digital

Design: Probe				
	Rod version	Sanitary version	Cable version	Sliding Coupling version
Max. length	5 500 mm (216.53 inch)	5 500 mm (216.53 inch)	30 000 mm (1 181.1 inch) liquids and slurries 5 000 mm (196.85 inch) solids (under loads)	5 500 mm (216.53 inch)
Process connection	R ¾", 1", 1¼", 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ¾", 1", 1¼", 1½" NPT [(Taper), ANSI/ASME B1.20.1] G ¾", 1", 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] 316L stainless steel ASME/EN flange	1½", 2" sanitary fitting clamp 316L stainless steel	R ¾", 1", 1¼", 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ¾", 1", 1¼", 1½" NPT [(Taper), ANSI/ASME B1.20.1] G ¾", 1", 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] 316L stainless steel ASME/EN flange	R ¾", 1", 1¼", 1½" inch [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ¾", 1", 1¼", 1½" NPT [(Taper), ANSI/ASME B1.20.1] G ¾", 1", 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]
Extension material	316L stainless steel optional PFA coated ¹⁾	316L stainless steel	Fluoroethylene propylene (FEP) cable with stainless steel core	316L stainless steel
Sensor wetted parts	PPS (optional PVDF)	PPS (optional PVDF)	PPS (optional PVDF)	PPS (optional PVDF)
O-ring seal material	FKM (optional FFKM) ²⁾	FKM (optional FFKM) ²⁾	FKM (optional FFKM) ²⁾	FKM (optional FFKM) ²⁾
Thermal isolator ³⁾	Optional	Optional	Optional	Optional
Extension	User selected length	User selected length	Cable extension	User selected length

¹⁾ PFA coating (7ML5634 and 7ML5644) has 120 micron thickness

²⁾ For Caustic Materials, please contact ceg.smpi@siemens.com for alternative O-Rings

³⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F).

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Digital

Selection and Ordering data	Article No.
Pointek CLS200 - Digital - Rod with Threaded or Flanged process connection	7ML5640-
Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection	
Threaded, 316L stainless steel	
¾" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
1½" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
Welded flange, 316L stainless steel, raised face	
1" ASME, 150 lb	5 A
1" ASME, 300 lb	5 B
1" ASME, 600 lb	5 C
1½" ASME, 150 lb	5 D
1½" ASME, 300 lb	5 E
1½" ASME, 600 lb	5 F
2" ASME, 150 lb	5 G
2" ASME, 300 lb	5 H
2" ASME, 600 lb	5 J
3" ASME, 150 lb	5 K
3" ASME, 300 lb	5 L
3" ASME, 600 lb	5 M
4" ASME, 150 lb	5 N
4" ASME, 300 lb	5 P
4" ASME, 600 lb	5 Q
Welded flange, 316L stainless steel, Type A flat faced	
DN 25, PN 16	6 A
DN 25, PN 40	6 B
DN 40, PN 16	6 C
DN 40, PN 40	6 D
DN 50, PN 16	6 E
DN 50, PN 40	6 F
DN 80, PN 16	6 G
DN 80, PN 40	6 H
DN 100, PN 16	6 J
DN 100, PN 40	6 K
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
Probe length (length from flange face) (threaded lengths include process thread)	
Note: No Y01 needed in Order code for standard lengths	
Compact [threaded 120 mm (4.72 inch), Flanged 98 mm (3.86 inch)]	A
Extended rod, 250 mm (9.84 inch)	B
Extended rod, 350 mm (13.78 inch)	C
Extended rod, 500 mm (19.69 inch)	D
Extended rod, 750 mm (29.53 inch)	E
Extended rod, 1 000 mm (39.37 inch)	F
Extended rod, 1 250 mm (49.21 inch)	G
Extended rod, 1 350 mm (53.15 inch)	H
Extended rod, 1 500 mm (59.06 inch)	J
Extended rod, 1 750 mm (68.90 inch)	K
Extended rod, 2 000 mm (78.74 inch)	L

Selection and Ordering data	Article No.
Pointek CLS200 - Digital - Rod with Threaded or Flanged process connection	7ML5640-
Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection	
Threaded, 316L stainless steel	
¾" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
1½" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
Welded flange, 316L stainless steel, raised face	
1" ASME, 150 lb	5 A
1" ASME, 300 lb	5 B
1" ASME, 600 lb	5 C
1½" ASME, 150 lb	5 D
1½" ASME, 300 lb	5 E
1½" ASME, 600 lb	5 F
2" ASME, 150 lb	5 G
2" ASME, 300 lb	5 H
2" ASME, 600 lb	5 J
3" ASME, 150 lb	5 K
3" ASME, 300 lb	5 L
3" ASME, 600 lb	5 M
4" ASME, 150 lb	5 N
4" ASME, 300 lb	5 P
4" ASME, 600 lb	5 Q
Welded flange, 316L stainless steel, Type A flat faced	
DN 25, PN 16	6 A
DN 25, PN 40	6 B
DN 40, PN 16	6 C
DN 40, PN 40	6 D
DN 50, PN 16	6 E
DN 50, PN 40	6 F
DN 80, PN 16	6 G
DN 80, PN 40	6 H
DN 100, PN 16	6 J
DN 100, PN 40	6 K
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
Probe length (length from flange face) (threaded lengths include process thread)	
Note: No Y01 needed in Order code for standard lengths	
Compact [threaded 120 mm (4.72 inch), Flanged 98 mm (3.86 inch)]	A
Extended rod, 250 mm (9.84 inch)	B
Extended rod, 350 mm (13.78 inch)	C
Extended rod, 500 mm (19.69 inch)	D
Extended rod, 750 mm (29.53 inch)	E
Extended rod, 1 000 mm (39.37 inch)	F
Extended rod, 1 250 mm (49.21 inch)	G
Extended rod, 1 350 mm (53.15 inch)	H
Extended rod, 1 500 mm (59.06 inch)	J
Extended rod, 1 750 mm (68.90 inch)	K
Extended rod, 2 000 mm (78.74 inch)	L
Thermal isolator	
Without thermal isolator	0
With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	1
Remote mount electronics and mounting bracket	
With 2 m (79 inch) of cable	2
With 5 m (197 inch) of cable	3
Wetted seals	
FKM	0
FFKM [for process temperatures above -20 °C (-4 °F)]	1
Probe material	
316L stainless steel with PPS probe body	0
316L stainless steel with PVDF probe body	1
Approvals	
Non-Sparking:	
CE, RCM, ATEX II 3 G Ex nA II T6...T4, ATEX II 2 D IP6X T100 °C	B
Dust Ignition Proof:	
CE, RCM, ATEX II 1/2 D T100 °C	C
Intrinsically Safe:¹⁾	
CE, RCM, ATEX II 1 G EEx ia IIC T6...T4, ATEX II 1/2 D IP6X T100 °C	D
Flameproof Enclosure with IS Probe:	
CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	E
Non-incendive:	
CSA/FM Class I, Div. 2, Groups A, B, C, D CSA/FM Class II, Div. 2, Groups F, G CSA/FM Class III T4 or T6	F
Dust Ignition Proof with IS Probe:	
CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	G
Intrinsically Safe:¹⁾	
CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	H
Explosion Proof with IS Probe:	
CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	J
General Purpose (CSA, FM)	
General Purpose (CE, RCM)	K
	L


4



Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Pointek CLS200 - Digital - Rod with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5640- 0	Pointek CLS200 - Digital - Cable with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5641- 0
Enclosure and lid Aluminum epoxy coated		↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
2 x 1/2" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x 1/2" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D	Process connection Threaded, 316L stainless steel	
1) Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.		3/4" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1] 1 1/4" NPT [(Taper), ANSI/ASME B1.20.1] 1 1/2" NPT [(Taper), ANSI/ASME B1.20.1] R 3/4" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 1 1/2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 3/4" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 1 1/2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	0 A 0 B 0 C 0 D 1 A 1 B 1 D 3 A 3 B 3 D
Selection and Ordering data Further designs Please add "-Z" to Article No. and specify Order code(s).	Order code	Welded flange, 316L stainless steel, raised face 1" ASME, 150 lb 1" ASME, 300 lb 1" ASME, 600 lb 1 1/2" ASME, 150 lb 1 1/2" ASME, 300 lb 1 1/2" ASME, 600 lb 2" ASME, 150 lb 2" ASME, 300 lb 2" ASME, 600 lb 3" ASME, 150 lb 3" ASME, 300 lb 3" ASME, 600 lb 4" ASME, 150 lb 4" ASME, 300 lb 4" ASME, 600 lb	5 A 5 B 5 C 5 D 5 E 5 F 5 G 5 H 5 J 5 K 5 L 5 M 5 N 5 P 5 Q
Total insertion length: enter the total insertion length in plain text description ● Y01 Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text ● Y15 Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000 ● C11 Inspection Certificate Type 3.1 per EN 10204 ● C12		Welded flange, 316L stainless steel, Type A flat faced DN 25, PN 16 DN 25, PN 40 DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 DN 100, PN 16 DN 100, PN 40	6 A 6 B 6 C 6 D 6 E 6 F 6 G 6 H 6 J 6 K
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36	(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
Accessories ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	See page 4/36		






Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Digital

Selection and Ordering data	Article No.
Pointek CLS200 - Digital - Cable with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5641- 
Probe length (length from flange face) (threaded lengths include process thread) Note: No Y01 needed in Order code for standard lengths Extended cable, 3 000 mm (118.11 inch), length can be determined by customer on assembly Extended cable, 6 000 mm (236.22 inch), length can be determined by customer on assembly Add Order code Y01 and plain text: "Insertion length ... mm" Extended cable, 5 000 mm (19.69 ... 196.85 inch) Extended cable, 5 001 ... 10 000 mm (196.89 ... 393.70 inch) Extended cable, 10 001 ... 15 000 mm (393.74 ... 590.55 inch) Extended cable, 15 001 ... 20 000 mm (590.59 ... 787.40 inch) Extended cable, 20 001 ... 25 000 mm (787.44 ... 984.25 inch) Extended cable, 25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)	A B C D E F G H
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1
Remote mount electronics and mounting bracket With 2 m (79 inch) of cable With 5 m (197 inch) of cable	2 3
Wetted seals FKM and PTFE FFKM and PTFE [for process temperatures above -20 °C (-4 °F)]	0 1
Probe material FEP jacketed cable with PPS probe body FEP jacketed cable with PVDF probe body	0 1
Approvals Non-Sparking: CE, RCM, ATEX II 3 G Ex nA II T6...T4, ATEX II 2 D IP6X T100 °C Dust Ignition Proof: CE, RCM, ATEX II 1/2 D T100 °C Intrinsically Safe: ¹⁾ CE, RCM, ATEX II 1 G EEx ia IIC T6...T4, ATEX II 1/2 D IP6X T100 °C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D CSA/FM Class II, Div. 2, Groups F, G CSA/FM Class III T4 or T6 Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Intrinsically Safe: ¹⁾ CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM) General Purpose (CE, RCM)	B C D E F G H J K L

Selection and Ordering data	Article No.
Pointek CLS200 - Digital - Cable with Threaded or Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5641- 
Enclosure and lid Aluminum epoxy coated 2 x 1/2" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x 1/2" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D
1) Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.	

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	 Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	 Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000	 C11
Inspection Certificate Type 3.1 per EN 10204	 C12
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Accessories We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.	See page 4/36

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Pointek CLS200 - Digital - Rod with Sanitary process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5642- - - - - - 0	Pointek CLS200 - Digital - Rod with Sanitary process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5642- - - - - - 0
Process connection Sanitary 316L stainless steel 1" sanitary fitting clamp 1½" sanitary fitting clamp 2" sanitary fitting clamp 2½" sanitary fitting clamp 3" sanitary fitting clamp (Note: Sanitary connection dimensionally corresponds to the applicable ISO 2852 standard.)	8 A 8 B 8 C 8 D 8 E	Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D CSA/FM Class II, Div. 2, Groups F, G CSA/FM Class III T4 or T6 Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Intrinsically Safe: ¹⁾ CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM) General Purpose (CE, RCM)	F G H J K L
Probe length (length from process connection face) Note: No Y01 needed in Order code for standard lengths Compact 98 mm (3.86 inch) Extended rod, 250 mm (9.84 inch) Extended rod, 350 mm (13.78 inch) Extended rod, 500 mm (19.69 inch) Extended rod, 750 mm (29.53 inch) Extended rod, 1 000 mm (39.37 inch) Extended rod, 1 250 mm (49.21 inch) Extended rod, 1 350 mm (53.15 inch) Extended rod, 1 500 mm (59.06 inch) Extended rod, 1 750 mm (68.90 inch) Extended rod, 2 000 mm (78.74 inch)	A B C D E F G H J K L	Enclosure and lid Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D
Add Order code Y01 and plain text: "Insertion length ... mm" Extended rod, 110 ... 350 mm (4.3 ... 13.78 inch) Extended rod, 351 ... 1 000 mm (13.82 ... 39.37 inch) Extended rod, 1 001 ... 2 000 mm (39.41 ... 78.74 inch) Extended rod, 2 001 ... 3 000 mm (78.78 ... 118.11 inch) Extended rod, 3 001 ... 4 000 mm (118.15 ... 157.48 inch) Extended rod, 4 001 ... 5 000 mm (157.52 ... 196.85 inch) Extended rod, 5 001 ... 5 500 mm (196.89 ... 216.53 inch)	M N P Q R S T	2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1	Selection and Ordering data	Order code
Remote mount electronics and mounting bracket With 2 m (79 inch) of cable With 5 m (197 inch) of cable	2 3	Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000 Inspection Certificate Type 3.1 per EN 10204	Y01 Y15 C11 C12
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1	Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Probe material 316L stainless steel with PPS probe body 316L stainless steel with PVDF probe body	0 1	Accessories We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ⚡. For details see page 9/5 in the appendix.	See page 4/36
Approvals Non-Sparking: CE, RCM, ATEX II 3 G Ex nA II T6...T4, ATEX II 2 D IP6X T100 °C Dust Ignition Proof: CE, RCM, ATEX II 1/2 D T100 °C Intrinsically Safe: ¹⁾ CE, RCM, ATEX II 1 G EEx ia IIC T6...T4, ATEX II 1/2 D IP6X T100 °C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	B C D E		

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Digital

Selection and Ordering data

Article No.

Pointek CLS200 - Digital - Rod with Sliding coupling with Threaded process connection

7ML5643-
- 0

Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process connection

Threaded, 316L stainless steel

3/4" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 A

1" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 B

1 1/4" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 C

1 1/2" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 D

R 3/4" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 A

R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 B

R 1 1/2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 D

G 3/4" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 A

G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 B

G 1 1/2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 D

Selection and Ordering data

Article No.

Pointek CLS200 - Digital - Rod with Sliding coupling with Threaded process connection

7ML5643-
- 0

Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.

Flameproof Enclosure with IS Probe:
CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4,
ATEX II 1/2 D T100 °C ● E

Non-incendive:
CSA/FM Class I, Div. 2, Groups A, B, C, D ● F
CSA/FM Class II, Div. 2, Groups F, G
CSA/FM Class III T4 or T6

Dust Ignition Proof with IS Probe:
CSA/FM Class II, Div. 1, Groups E, F, G ● G
CSA/FM Class III T4

Intrinsically Safe:¹⁾
CSA/FM Class I, Div. 1, Groups A, B, C, D ● H
CSA/FM Class II, Div. 1, Groups E, F, G
CSA/FM Class III T4

Explosion Proof with IS Probe:
CSA/FM Class I, Div. 1, Groups A, B, C, D ● J
CSA/FM Class II, Div. 1, Groups E, F, G
CSA/FM Class III T4

General Purpose (CSA, FM) ● K

General Purpose (CE, RCM) ● L

Enclosure and lid

Aluminum epoxy coated

2 x 1/2" NPT via adapter - cable inlet, IP65 ● A

2 x M20x1.5 cable inlet, IP65 ● B

2 x 1/2" NPT via adapter - cable inlet, IP68 ● C

2 x M20x1.5 cable inlet, IP68 ● D

¹⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Total insertion length: enter the total insertion length in plain text description ● Y01

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: ● Y15

Measuring-point number/identification (max. 27 characters) specify in plain text ● C11

Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000 ● C12

Inspection Certificate Type 3.1 per EN 10204 ● C12

Operating Instructions

Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.

See page 4/36

Accessories

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.
Pointek CLS200 - Digital - PFA Rod with PFA Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5644-
Process connection Welded flange, PFA coated, 316L stainless steel, raised face 1" ASME, 150 lb 1" ASME, 300 lb 1" ASME, 600 lb 1½" ASME, 150 lb 1½" ASME, 300 lb 1½" ASME, 600 lb 2" ASME, 150 lb 2" ASME, 300 lb 2" ASME, 600 lb 3" ASME, 150 lb 3" ASME, 300 lb 3" ASME, 600 lb 4" ASME, 150 lb 4" ASME, 300 lb 4" ASME, 600 lb Welded flange, PFA coated, 316L stainless steel, Type A flat faced DN 25, PN 16 DN 25, PN 40 DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 DN 100, PN 16 DN 100, PN 40 (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	5 A 5 B 5 C 5 D 5 E 5 F 5 G 5 H 5 J 5 K 5 L 5 M 5 N 5 P 5 Q 6 A 6 B 6 C 6 D 6 E 6 F 6 G 6 H 6 J 6 K
Probe length (length from process connection face) Note: No Y01 needed in Order code for standard lengths Compact 98 mm (3.86 inch) Extended rod, 250 mm (9.84 inch) Extended rod, 350 mm (13.78 inch) Extended rod, 500 mm (19.69 inch) Extended rod, 750 mm (29.53 inch) Extended rod, 1 000 mm (39.37 inch) Extended rod, 1 250 mm (49.21 inch) Extended rod, 1 350 mm (53.15 inch) Extended rod, 1 500 mm (59.06 inch) Extended rod, 1 750 mm (68.90 inch) Extended rod, 2 000 mm (78.74 inch) Add Order code Y01 and plain text: "Insertion length ... mm" Extended rod, 200 ... 1 000 mm (7.87 ... 39.37 inch) Extended rod, 1 001 ... 2 000 mm (39.41 ... 78.74 inch) Extended rod, 2 001 ... 3 000 mm (78.78 ... 118.11 inch) Extended rod, 3 001 ... 4 000 mm (118.15 ... 157.48 inch) Extended rod, 4 001 ... 5 000 mm (157.52 ... 196.85 inch) Extended rod, 5 001 ... 5 500 mm (196.89 ... 216.53 inch)	A B C D E F G H J K L M N P Q R S
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1

Selection and Ordering data	Article No.
Pointek CLS200 - Digital - PFA Rod with PFA Flanged process connection Versatile inverse frequency shift capacitance level and material detection switch with optional process connection choices and configurable output. CLS200 is ideal for detection of liquids, solids, slurries, foam, and interfaces, and has the ability to tune out build-up on the probe.	7ML5644-
Remote mount electronics and mounting bracket With 2 m (79 inch) of cable With 5 m (197 inch) of cable Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)] Probe material PFA Coated 316L stainless steel with PPS probe body PFA Coated 316L stainless steel with PVDF probe body Approvals Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D CSA/FM Class II, Div. 2, Groups F, G CSA/FM Class III T4 or T6 Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Intrinsically Safe: ¹⁾ CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM) Enclosure and lid Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	2 3 0 1 0 1 F G H J K A B C D
Enclosure and lid Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68 ¹⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection	

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/36
Accessories	See page 4/36

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard and Digital

Selection and Ordering data

Article No.

Operating Instructions - Standard

English

7ML1998-5JH04

German

7ML1998-5JH34

Note: The Operating Instructions should be ordered as a separate line on the order.

Quick Start manual, multi-language

A5E32221251

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Operating Instructions - Digital

English

7ML1998-5JJ05

German

7ML1998-5JJ34

French

7ML1998-5JJ11

Note: The Operating Instructions should be ordered as a separate line on the order.

Quick Start manual, multi-language

A5E32221496

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Accessories

SensGuard, 3/4" NPT (PPS)

7ML1830-1DL

Only available for CLS200 with 3/4" NPT thread

SensGuard, R 1" (BSPT) (PPS)

7ML1830-1DM

Only available for CLS200 with 3/4" NPT thread

One metallic cable gland M20x1.5, -40 ... +80 °C (-40 ... +176 °F) with integrated shield connection (available for PROFIBUS PA)

7ML1930-1AQ

General Purpose

1/2" NPT General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 6 ... 12 mm (0.236 ... 0.472 inch)

7ML1830-1JA

M20x1.5 General Purpose Cable Entry IP68/IP69K NEMA6,-40 ... -100 °C (-40 ... -212 °F), cable size 7 ... 12 mm (0.275 ... 0.472 inch)

7ML1830-1JC

Hazardous Locations

1/2" NPT EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22, and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)

7ML1830-1JB

M20 EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22 and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)

7ML1830-1JD

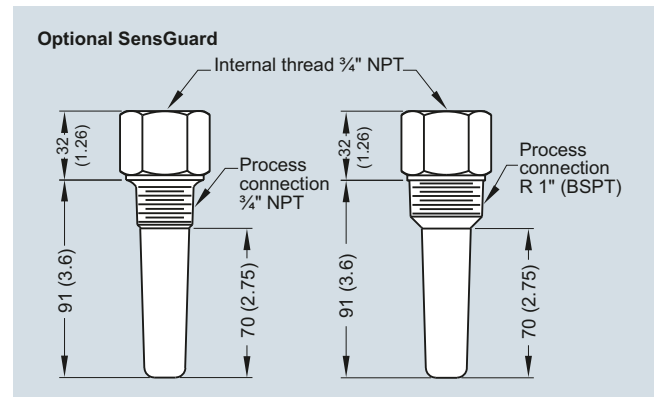
Blind threaded flanges are available.

Please contact ceg.smpi@siemens.com with a completed application data sheet on page 4/11

Pointek Specials

See page 4/80

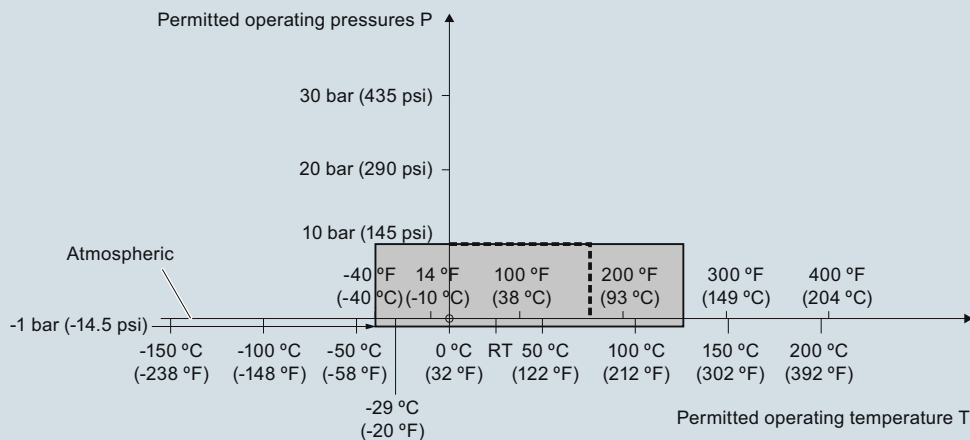
Options



Optional SensGuard, dimensions in mm (inch)

Characteristic curves

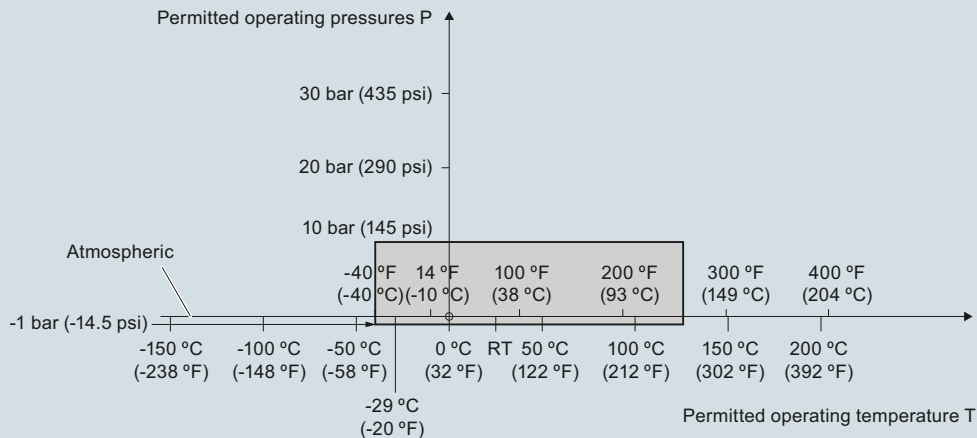
Pressure/temperature curve
CLS200 sliding coupling
threaded process connections
(7ML5633 and 7ML5643)



----- Example:
 Permitted operating pressure = 10 bar (145 psi) at 75 °C

Pointek CLS200 Process Pressure/Temperature derating curves (7ML5633 and 7ML5643)

Pressure/temperature curve
CLS200 cable
Threaded process connections
(7ML5631 and 7ML5641)



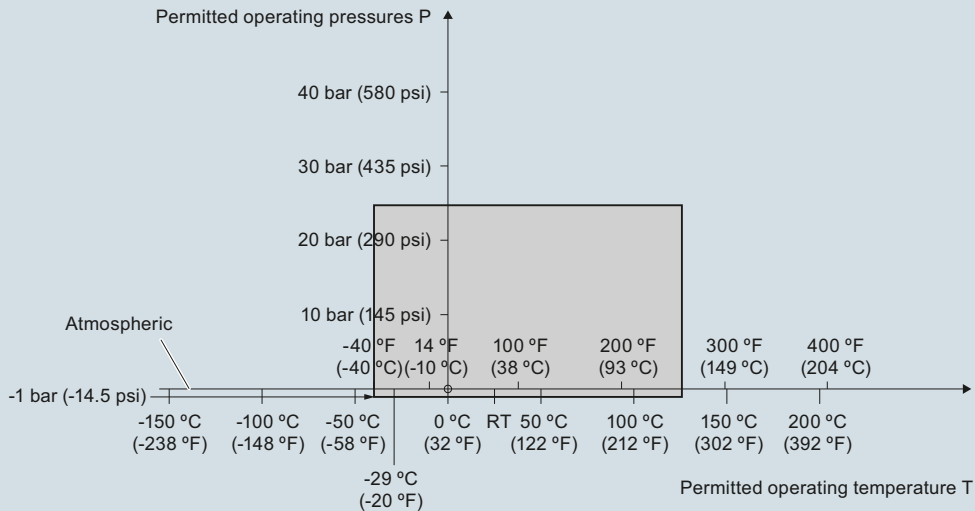
Pointek CLS200 Process Pressure/Temperature derating curves (7ML5631 and 7ML5641)

Level Measurement

Point level measurement – Capacitance switches

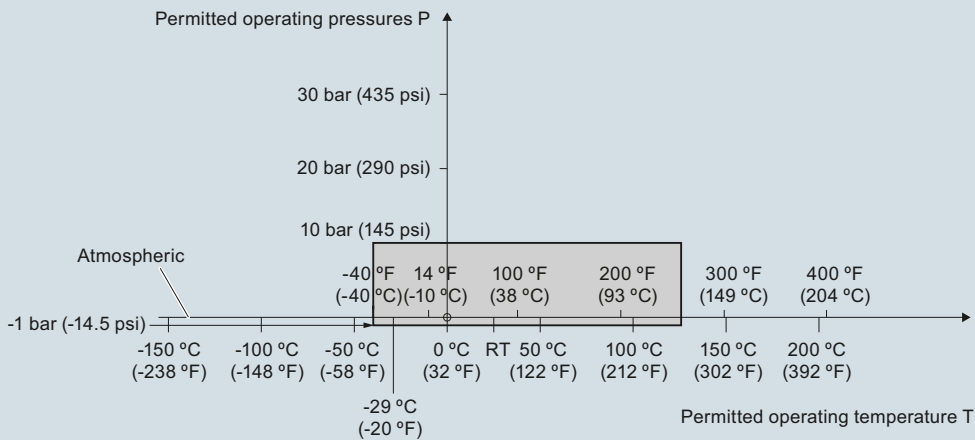
Pointek CLS200 – Standard and Digital

Pressure/temperature curve
CLS200 compact and extended rod
Threaded process connections
(7ML5630 and 7ML5640)



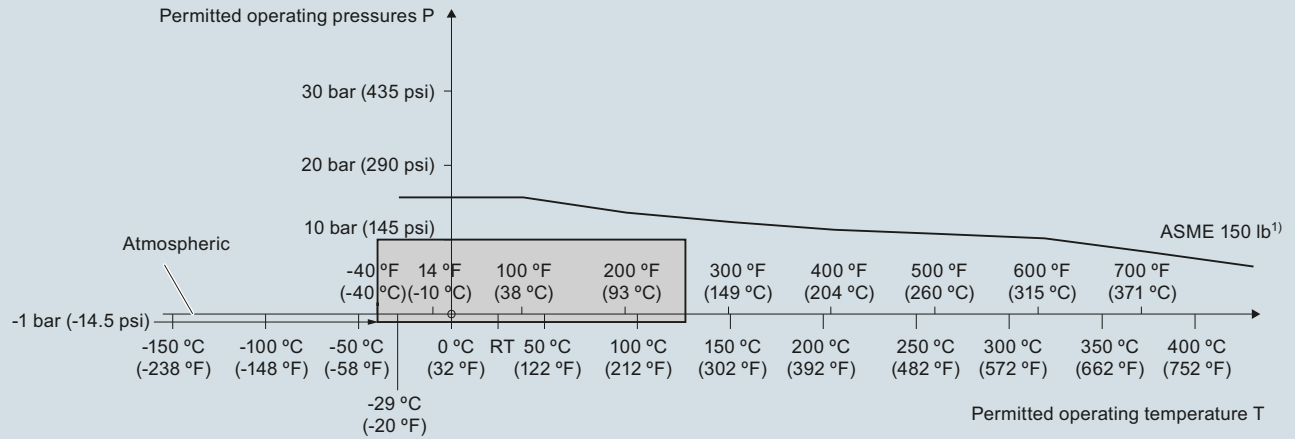
Pointek CLS200 Process Pressure/Temperature derating curves (7ML5630 or 7ML5640)

Pressure/temperature curve
CLS200 compact and extended sanitary type
Sanitary process connections
(7ML5632 and 7ML5642)



Pointek CLS200 Process Pressure/Temperature derating curves (7ML5632 and 7ML5642)

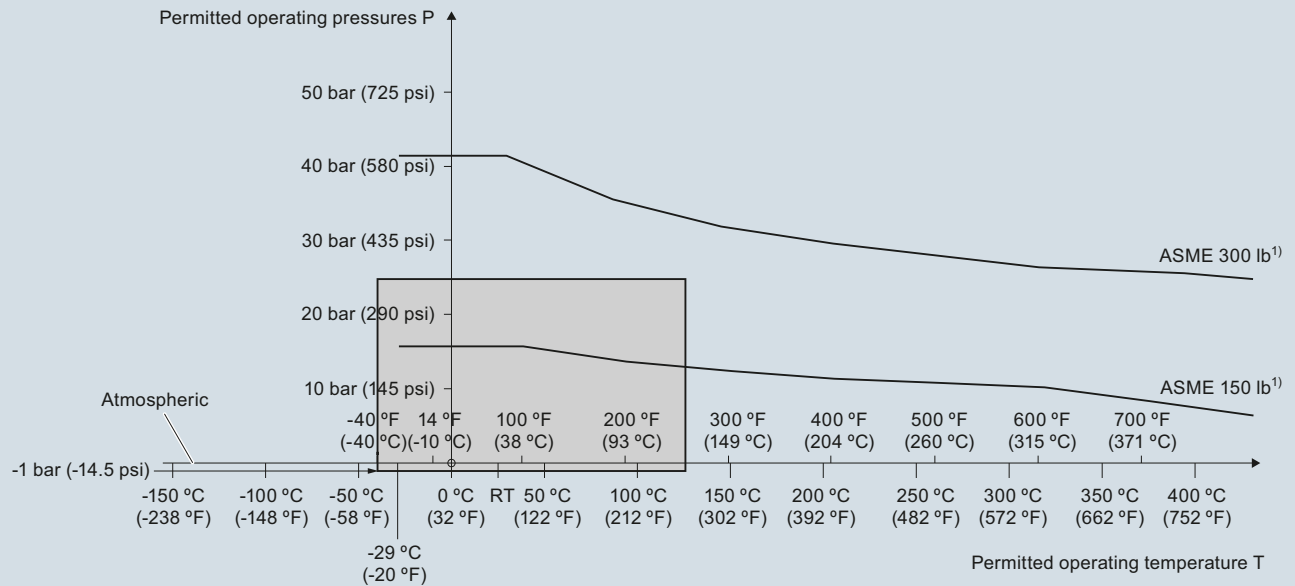
Pressure/temperature curve
CLS200 cable
ASME flanged process connections
(7ML5631 and 7ML5641)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

Pointek CLS200 Process Pressure/Temperature derating curves (7ML5631 and 7ML5641)

Pressure/temperature curve
CLS200 compact and extended rod
ASME flanged process connections
(7ML5630 and 7ML5640)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

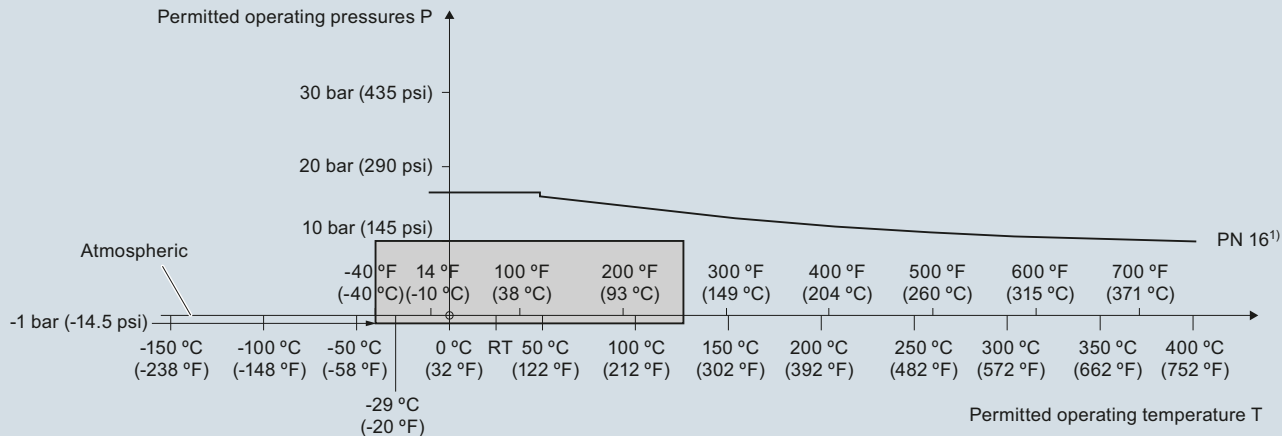
Pointek CLS200 Process Pressure/Temperature derating curves (7ML5630 and 7ML5640)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS200 – Standard and Digital

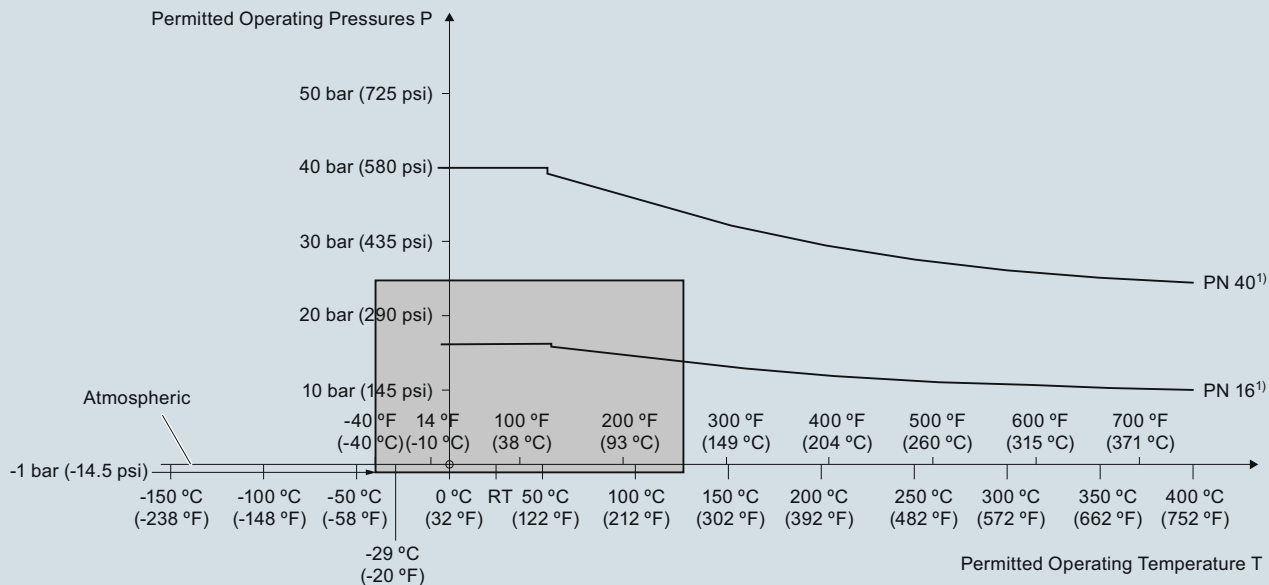
Pressure/temperature curve
CLS200 cable
EN flanged process connections
(7ML5631 and 7ML5641)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

Pointek CLS200 Process Pressure/Temperature derating curves (7ML5631 and 7ML5641)

Pressure/Temperature Curve
CLS200 Compact and Extended Rod
EN Flanged Process Connections
(7ML5630 and 7ML5640)



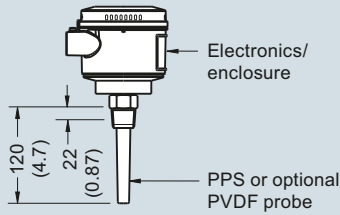
¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

Pointek CLS200 Process Pressure/Temperature derating curves (7ML5630 and 7ML5640)

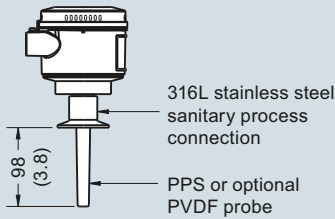
4

Dimensional drawings

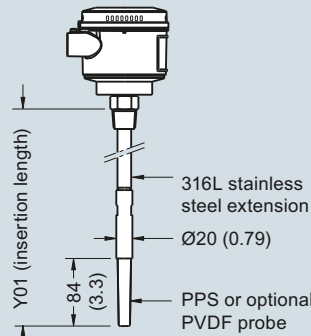
**Compact version
Threaded
(7ML5630 and 7ML5640)**



**Sanitary compact version
Sanitary fitting
(7ML5632 and 7ML5642)**

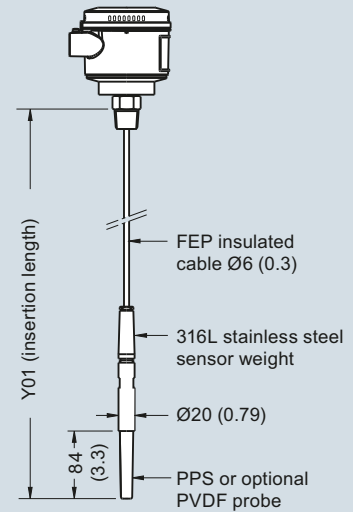


**Extended rod version
Threaded
(7ML5630 and 7ML5640)**

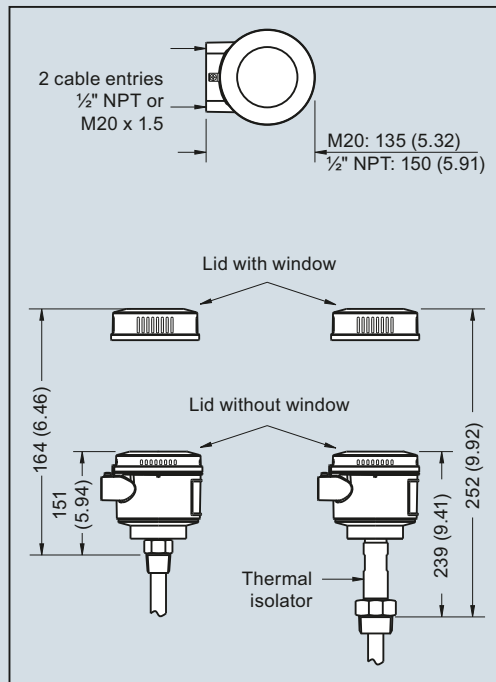


Min. insertion length = 200 (7.87)
Max. insertion length = 5 500 (216)

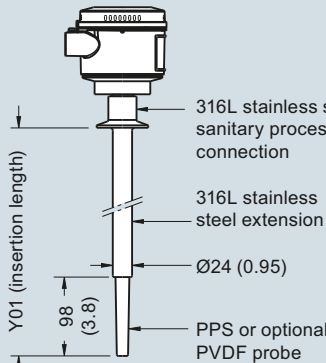
**Extended cable version
Threaded
(7ML5631 and 7ML5641)**



Min. insertion length = 500 (19.69)
Max. insertion length = 30 000 (1 181)
Applicable for liquids and solids
applications. Cable can be shortened
on site.

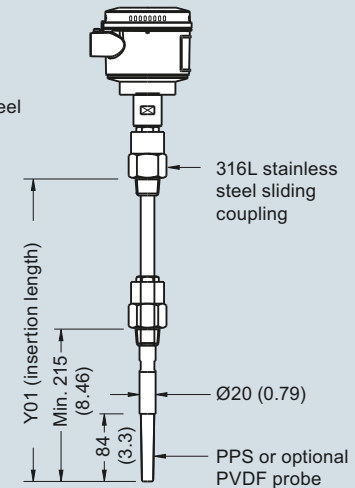


**Sanitary extended version
Sanitary fitting
(7ML5632 and 7ML5642)**



Min. insertion length = 110 (4.3)
Max. insertion length = 5 500 (216)

**Sliding coupling version
Threaded
(7ML5633 and 7ML5643)**



Min. insertion length = 350 (13.82)
Max. insertion length = 5 500 (216)

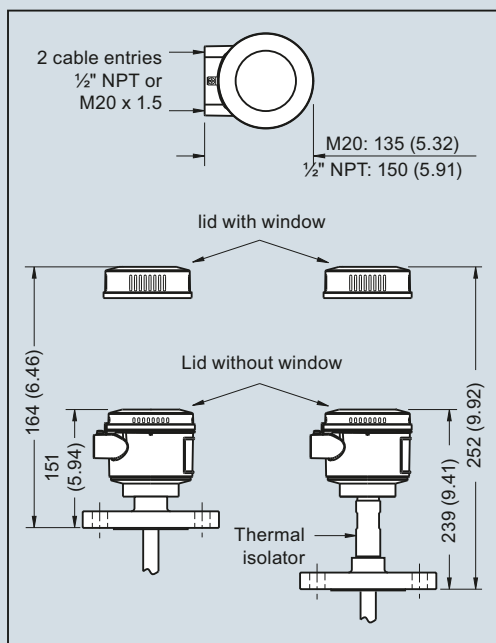
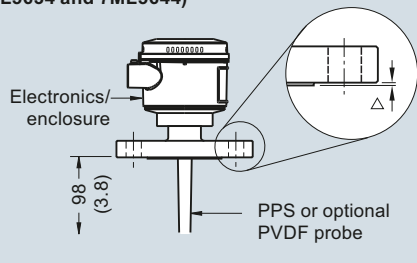
Pointek CLS200 - Threaded/sanitary process connections, dimensions in mm (inch)

Level Measurement

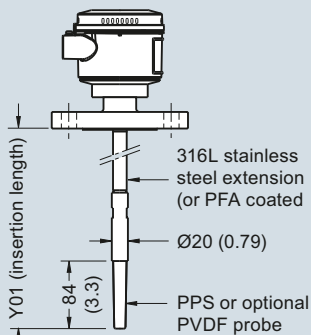
Point level measurement – Capacitance switches

Pointek CLS200 – Standard and Digital

Compact version
Welded Flange (7ML5630 and 7ML5640)
Welded Flange, PFA coated
(7ML5634 and 7ML5644)

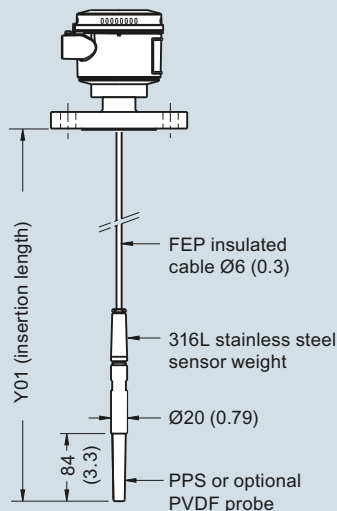


Extended rod version
Welded Flange (7ML5630 and 7ML5640)
Welded Flange, PFA coated
(7ML5634 and 7ML5644)



Min. insertion length = 200 (7.87)
 Max. insertion length = 5 500 (216)

Extended cable version
Welded Flange
(7ML5631 and 7ML5641)



Min. insertion length = 500 (19.69)
 Max. insertion length = 30 000 (1 181)
 Applicable for liquids and solids applications. Cable can be shortened on site.

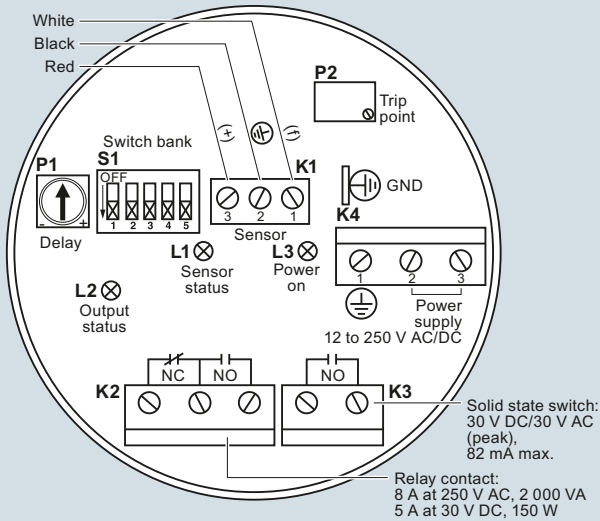
Flange Facing (raised face)	
Flange Class	Facing thickness
△ ASME 150/300	2 (0.08)
△ ASME 600/900	7 (0.28)
△ PN16/40	2 (0.08)

Insertion length does not include any raised face/gasket face dimension (see Flange Facing Table above)

Pointek CLS200 - Flanged Process Connections, dimensions in mm (inch)

Schematics

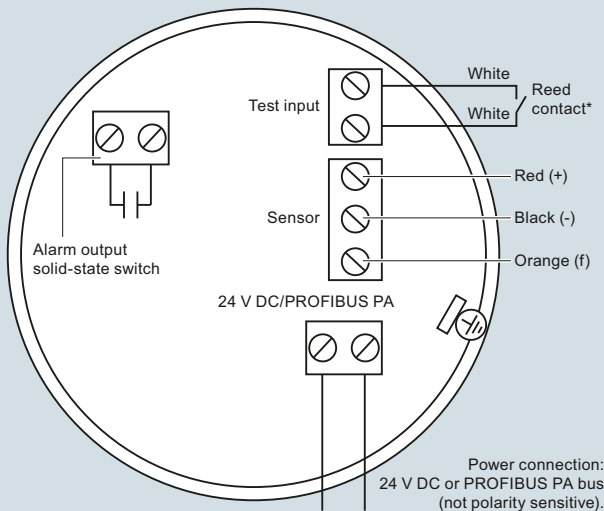
Wiring: Pointek CLS200 standard



Notes:

- Identification label is on underside of lid. Switch and potentiometer settings are for illustration purposes only (refer to operation/setup in manual).
- All field wiring must have insulation suitable for at least 250 V.
- Relay contact terminals are for use with equipment having no accessible live parts and wiring having insulation suitable for at least 250 V.
- Maximum working voltage between adjacent relay contacts shall be 250 V.
- Refer to the Instruction Manual or contact Siemens representative for detailed wiring information.

Wiring: Pointek CLS200 Digital



Notes:

Refer to the instruction manual or contact a Siemens representative for detailed wiring information.

***Magnet activated sensor Test**

A magnet can be used to test the sensor without opening the lid of the Pointek CLS200 Digital version. Bring the magnet close to the test area indicated on the enclosure. The sensor test starts and finishes automatically after 10 seconds.



Pointek CLS200 connections

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard

Overview



Pointek CLS300 (standard version) is an inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.

Benefits

- Patented Active-Shield technology so measurement is unaffected by material buildup or nozzle interference in active shield section
- Performs in extremely abrasive conditions because of solid rod construction
- Three LED indicators for adjustment control, output status and power
- High-temperature version up to 400 °C (752 °F)

Application

Pointek CLS300 standard version has three LED indicators with basic relay and solid-state switch alarms.

The robust design of CLS300 makes it specifically applicable for heavy solids applications where abrasive materials occur as in the mining industry.

The fully potted electronics are unaffected by condensation, dust or vibration.

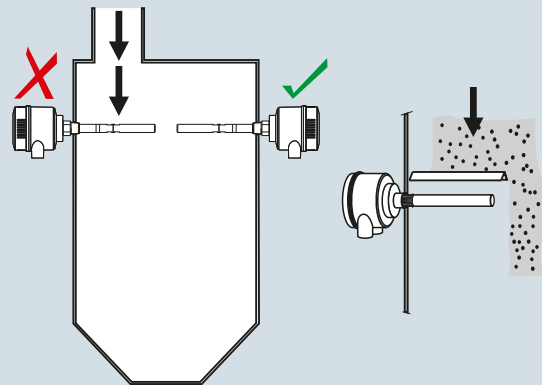
Wetted parts are made of stainless steel with a PFA shield for high chemical resistance, and of ceramic and stainless steel for high temperature version. Materials with low or high dielectric constants can be accurately detected. The unique Active Shield suppresses interference from material buildup or long installation nozzles.

The unique modular design of the Pointek CLS300 provides a wide range of configurations, process connections, extensions and approvals to meet the temperature and pressure requirements of specific applications. The modular design makes ordering easier and reduces stocking requirements. A wide range of probe configurations are available, including rod and cable versions.

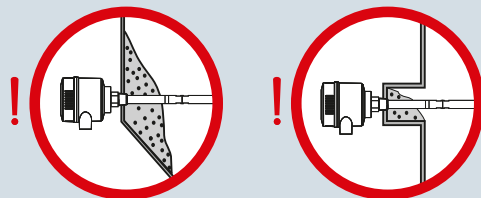
- Key Applications: liquids, slurries, bulk solids, relatively high pressure and temperature, hazardous areas, milling and mining applications

Configuration

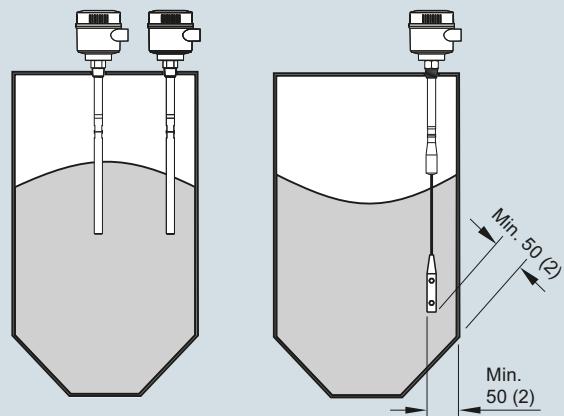
Installation



Keep unit out of path of falling material, or protect probe from falling material.



Build up of material in active shield area does not affect switch operation.



Install probe at least 50 (2) from tank wall.
Note angle of repose and adjust accordingly.

Pointek CLS300 installation, dimensions in mm (inch)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard

Technical specifications

Mode of operation	
Measuring principle	Inverse frequency shift capacitive level detection
Input	
Measured variable	Change in picoFarad (pF)
Output	
Output signal	
• Relay output	1 SPDT Form C relay
- Max. contact voltage	• 30 V DC • 250 V AC
- Max. contact current	• 5 A (DC) • 8 A (AC)
- Max. switching capacity	• 150 W (DC) • 2 000 VA (AC)
- Time delay (ON and/or OFF)	1 ... 60 s
• Solid-state output	
- Output	Galvanically isolated
- Protection	Against reversed polarity (bipolar)
- Max. switching voltage	• 30 V (DC) • 30 V peak (AC)
- Max. load current	82 mA
- Voltage drop	< 1 V, typical at 50 mA
- Time delay (pre or post switching)	1 ... 60 s
Accuracy	
Resolution	
• Min. sensitivity (pF)	1 % change in actual capacitance
• Max. temperature error	0.2 % of actual capacitance value
Rated operating conditions¹⁾	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +85 °C (-40 ... +185 °F) ²⁾
Medium conditions	
	Liquids, bulk solids, slurries and interfaces, and applications with viscous materials
• Relative dielectric constant ϵ_r	Min. 1.5
• Process temperature	
- Rod/Cable version	-40 ... +200 °C (-40 ... +392 °F) ²⁾
- High-temperature version	-40 ... +400 °C (-40 ... +752 °F)
• Process pressure ³⁾	-1 ... +35 bar g (-14.6 ... +511 psi g)

Design	
Material (enclosure)	Powder-coated aluminum with gasket
Degree of Protection	Standard: Type 4/NEMA 4/IP65 Optional: Type 4/NEMA 4/IP68
Cable inlet	2 x M20x1.5 thread (option: 2 x ½" NPT conduit entry including 1 plugged entry)
Controls and displays	
Displays	3 LEDs, for probe status, output status and power supply
Potentiometers	2 potentiometers for time delay and sensitivity
Switches	5 DIP switches for delay on/off, fail-safe high/low, time delay test/adjust, high/low sensitivity, test delay settings
Power supply	
Supply	12 ... 250 V AC/DC, 0 ... 60 Hz, galvanically isolated, 2 W
Certificates and approvals	
General Purpose	CSA, FM, CE, RCM
Flameproof Enclosure with IS Probe	ATEX II 1/2 G EEx d[ia] IIC T6...T1 ATEX II 1/2 D T100 °C
Dust Ignition Proof with IS Probe	ATEX II 1/2 D T100 °C CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Explosion Proof Enclosure with IS Probe	CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Marine	Lloyds Register of Shipping, Categories ENV1, ENV2 and ENV5
Overfill Protection	WHG (Germany) VLAREM II (Belgium)
Others	Pattern Approval (China)
¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves starting on page 4/58. ²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F). ³⁾ Pressure rating of process seal is temperature dependent. See Pressure/Temperature curves starting on page 4/58.	

Design: Probe

	Rod version	High Temperature version	Cable version
Length	Min. 250 mm (9.8 inch), max. 1 000 mm (40 inch)	Min. 250 mm (9.8 inch), max. 1 000 mm (40 inch)	Min. 1 000 mm (40 inch), max. 25 000 mm (984 inch)
Sensor wetted parts	PFA (no insulation on active probe), 316L stainless steel, PEEK isolators	Ceramic (ZrO ₂ ¹⁾) isolators (no insulation on active probe), 316L stainless steel	316 stainless steel, optional PFA, PEEK isolators
O-ring seal material	FKM (optional FFKM) ²⁾	Graphite ²⁾	FKM (optional FFKM) ²⁾
Thermal isolator	Optional	Standard	Optional
Extension	User selectable length	User selectable length	User selectable cable length

¹⁾ Zirconium Oxide

²⁾ For Caustic Materials, please contact ceg.smpi@siemens.com for alternative O-Rings.

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard

Selection and Ordering data

Article No.

Pointek CLS300 - Standard - Rod Version with Threaded or Flanged process connection

7ML5650-

Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present, and has the ability to tune out build-up on the probe.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process connection

Threaded, 316L stainless steel

¾" NPT [(Taper), ANSI/ASME B1.20.1]

0 A

1" NPT [(Taper), ANSI/ASME B1.20.1]

0 B

1¼" NPT [(Taper), ANSI/ASME B1.20.1]

0 C

1½" NPT [(Taper), ANSI/ASME B1.20.1]

0 D

R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]

1 A

R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]

1 B

R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]

1 D

G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]

3 A

G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]

3 B

G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]

3 D

Welded flange, 316L stainless steel, raised face

1" ASME, 150 lb

5 A

1" ASME, 300 lb

5 B

1" ASME, 600 lb

5 C

1½" ASME, 150 lb

5 D

1½" ASME, 300 lb

5 E

1½" ASME, 600 lb

5 F

2" ASME, 150 lb

5 G

2" ASME, 300 lb

5 H

2" ASME, 600 lb

5 J

3" ASME, 150 lb

5 K

3" ASME, 300 lb

5 L

3" ASME, 600 lb

5 M

4" ASME, 150 lb

5 N

4" ASME, 300 lb

5 P

4" ASME, 600 lb

5 Q

Welded flange, 316L stainless steel, Type A flat faced

DN 25, PN 16

6 A

DN 25, PN 40

6 B

DN 40, PN 16

6 C

DN 40, PN 40

6 D

DN 50, PN 16

6 E

DN 50, PN 40

6 F

DN 80, PN 16

6 G

DN 80, PN 40

6 H

DN 100, PN 16

6 J

DN 100, PN 40

6 K

(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)

Probe length (length from flange face)

(threaded lengths include process thread)

Note: No Y01 needed in Order code for standard lengths

Standard version, rod 350 mm (13.78 inch)

A

Extended rod, length 500 mm (19.69 inch)

B

Extended rod, length 750 mm (29.53 inch)

C

Extended rod, length 1 000 mm (39.37 inch)

D

Selection and Ordering data

Article No.

Pointek CLS300 - Standard - Rod Version with Threaded or Flanged process connection

7ML5650-

Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present, and has the ability to tune out build-up on the probe.

Add Order code Y01 and plain text:

"Insertion length ... mm"

Extended rod, factory adjusted length 250 ... 499 mm (9.8 ... 19.65 inch)

E

Extended rod, factory adjusted length 500 ... 749 mm (19.69 ... 29.49 inch)

F

Extended rod, factory adjusted length 750 ... 999 mm (29.53 ... 39.3 inch)

G

Thermal isolator

Without thermal isolator

0

With thermal isolator [for process connection temperatures over 85 °C (185 °F)]

1

Wetted seals

FKM

0

FFKM [for process temperatures above -20 °C (-4 °F)]

1

Probe material

316L stainless steel with PFA lining and PEEK isolators

0

Approvals

Dust Ignition Proof with IS Probe: CE, RCM, ATEX II 1/2 D T100 °C

C

Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T1, ATEX II 1/2 D T100 °C

D

Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T1, ATEX II 1/2 D T100 °C

E

Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4

F

Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4

G

General Purpose (CSA, FM)

H

General Purpose (CE, RCM)

J

General Purpose with WHG approval (CSA, FM, CE, RCM)

K

Enclosure and lid

Aluminum epoxy coated

2 x ½" NPT via adapter - cable inlet, IP65

A

2 x M20x1.5 cable inlet, IP65

B

2 x ½" NPT via adapter - cable inlet, IP68

C

2 x M20x1.5 cable inlet, IP68

D

Active shield length

Standard length - (125 mm threaded, 105 mm flanged)

0

Extended shield - (250 mm threaded, 230 mm flanged)¹⁾


1


Extended shield - (400 mm threaded, 380 mm flanged)²⁾

2

¹⁾ Available with Probe version options B ... D, F, G only [≥ 500 mm (19.69 inch)]

²⁾ Available with Probe version options C, D, and, G only [≥ 750 mm (29.53 inch)]

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs		Pointek CLS300 - Standard - Cable Version with Threaded or Flanged process connection	7ML5651-
Please add "-Z" to Article No. and specify Order code(s).		Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present, and has the ability to tune out build-up on the probe.	- - - - -
Total insertion length: enter the total insertion length in plain text description	Y01	Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15	Process connection	
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11	Threaded, 316L stainless steel	
Inspection Certificate Type 3.1 per EN 10204	C12	1¼" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/57	1½" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
Accessories	See page 4/57	R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.		G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
		Welded flange, 316L stainless steel, raised face	
		1½" ASME, 150 lb	5 D
		1½" ASME, 300 lb	5 E
		1½" ASME, 600 lb	5 F
		2" ASME, 150 lb	5 G
		2" ASME, 300 lb	5 H
		2" ASME, 600 lb	5 J
		3" ASME, 150 lb	5 K
		3" ASME, 300 lb	5 L
		3" ASME, 600 lb	5 M
		4" ASME, 150 lb	5 N
		4" ASME, 300 lb	5 P
		4" ASME, 600 lb	5 Q
		Welded flange, 316L stainless steel, Type A flat faced	
		DN 40, PN 16	6 C
		DN 40, PN 40	6 D
		DN 50, PN 16	6 E
		DN 50, PN 40	6 F
		DN 80, PN 16	6 G
		DN 80, PN 40	6 H
		DN 100, PN 16	6 J
		DN 100, PN 40	6 K
		(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
		Probe length (length from flange face) (threaded lengths include process thread)	
		Note: No Y01 needed in Order code for standard lengths	
		Extended cable, 3 000 mm (118.11 inch), length can be shortened by customer	A
		Extended cable, 6 000 mm (236.22 inch), length can be shortened by customer	B
		Add Order code Y01 and plain text: "Insertion length ... mm"	
		Extended cable, 500 ... 1 000 mm (19.69 ... 39.37 inch)	E
		Extended cable, 1 001 ... 5 000 mm (39.41 ... 196.85 inch)	F
		Extended cable, 5 001 ... 10 000 mm (196.89 ... 393.70 inch)	G
		Extended cable, 10 001 ... 15 000 mm (393.74 ... 590.55 inch)	H
		Extended cable, 15 001 ... 20 000 mm (590.59 ... 787.40 inch)	J
		Extended cable, 20 001 ... 25 000 mm (787.44 ... 984.25 inch)	K

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard

Selection and Ordering data	Article No.
Pointek CLS300 - Standard - Cable Version with Threaded or Flanged process connection Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present, and has the ability to tune out build-up on the probe.	7ML5651-
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1
Probe material Bare 316L stainless steel cable, PEEK isolators and 316L stainless steel cable weight PFA coated cable, PEEK isolators and 316L stainless steel cable weight	0 1
Approvals Dust Ignition Proof with IS Probe: CE, RCM, ATEX II 1/2 D T100 °C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T1, ATEX II 1/2 D T100 °C Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T1, ATEX II 1/2 D T100 °C Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM) General Purpose (CE, RCM) General Purpose with WHG approval (CSA, FM, CE, RCM)	C D E F G H J K
Enclosure and lid <u>Aluminum epoxy coated</u> 2 x ½" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x ½" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D
Active shield length Standard length - (125 mm threaded, 105 mm flanged) Extended shield - (250 mm threaded, 230 mm flanged) ¹⁾ Extended shield - (400 mm threaded, 380 mm flanged) ¹⁾	0 1 2

¹⁾ Available with Probe version options A, B, F ... K, only [≥ 1 000 mm (39.7 inch)]

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204	Y01 Y15 C11 C12
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/57
Accessories	See page 4/57

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.
Pointek CLS300 - Standard - High Temperature Rod Version with Threaded or Flanged process connection	7ML5652-
Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present, and has the ability to tune out build-up on the probe.	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection	
<u>Threaded, 316L stainless steel</u>	
3/4" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
1 1/4" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
1 1/2" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
R 3/4" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
R 1 1/2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
G 3/4" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
G 1 1/2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
<u>Welded flange, 316L stainless steel, raised face</u>	
1" ASME, 150 lb	5 A
1" ASME, 300 lb	5 B
1" ASME, 600 lb	5 C
1 1/2" ASME, 150 lb	5 D
1 1/2" ASME, 300 lb	5 E
1 1/2" ASME, 600 lb	5 F
2" ASME, 150 lb	5 G
2" ASME, 300 lb	5 H
2" ASME, 600 lb	5 J
3" ASME, 150 lb	5 K
3" ASME, 300 lb	5 L
3" ASME, 600 lb	5 M
4" ASME, 150 lb	5 N
4" ASME, 300 lb	5 P
4" ASME, 600 lb	5 Q
<u>Welded flange, 316L stainless steel, Type A flat faced</u>	
DN 25, PN 16	6 A
DN 25, PN 40	6 B
DN 40, PN 16	6 C
DN 40, PN 40	6 D
DN 50, PN 16	6 E
DN 50, PN 40	6 F
DN 80, PN 16	6 G
DN 80, PN 40	6 H
DN 100, PN 16	6 J
DN 100, PN 40	6 K
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
Probe length (length from flange face) (threaded lengths include process thread)	
<u>Note: No Y01 needed in Order code for standard lengths</u>	
Standard version rod 350 mm (13.78 inch)	A
Extended rod, length 500 mm (19.69 inch)	B
Extended rod, length 750 mm (29.53 inch)	C
Extended rod, length 1 000 mm (39.37 inch)	D

Selection and Ordering data	Article No.
Pointek CLS300 - Standard - High Temperature Rod Version with Threaded or Flanged process connection	7ML5652-
Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. CLS300 is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present, and has the ability to tune out build-up on the probe.	
<u>Add Order code Y01 and plain text: "Insertion length ... mm"</u>	
Extended rod, factory adjusted length 250 ... 499 mm (9.8 ... 19.65 inch)	E
Extended rod, factory adjusted length 500 ... 749 mm (19.69 ... 29.49 inch)	F
Extended rod, factory adjusted length 750 ... 999 mm (29.53 ... 39.3 inch)	G
Wetted seals	
Graphite	0
Probe material	
316L stainless steel with ceramic (ZrO ₂) isolators	0
Approvals	
Dust Ignition Proof with IS Probe: CE, RCM, ATEX II 1/2 D T100 °C	C
Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T1, ATEXII 1/2 D T100 °C	D
Flameproof Enclosure with IS Probe, with WHG approval: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T1, ATEX II 1/2 D T100 °C	E
Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	F
Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	G
General Purpose (CSA, FM)	H
General Purpose (CE, RCM)	J
General Purpose with WHG approval (CSA, FM, CE, RCM)	K
Enclosure and lid	
<u>Aluminum epoxy coated</u>	
2 x 1/2" NPT via adapter - cable inlet, IP65	A
2 x M20x1.5 cable inlet, IP65	B
2 x 1/2" NPT via adapter - cable inlet, IP68	C
2 x M20x1.5 cable inlet, IP68	D
Active shield length	
Standard length - (125 mm threaded, 105 mm flanged)	0
Extended shield - (250 mm threaded, 230 mm flanged) ¹⁾	1
Extended shield - (400 mm threaded, 380 mm flanged) ²⁾	2
¹⁾ Available with Probe version options B ... D, F, G only [≥ 500 mm (19.69 inch)]	
²⁾ Available with Probe version options C, D, and, G only [≥ 750 mm (29.53 inch)]	
• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix.	

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	◆ Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	◆ Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	◆ C11
Inspection Certificate Type 3.1 per EN 10204	◆ C12
Operating Instructions	
Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/57
Accessories	
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	See page 4/57

Overview



Pointek CLS300 (digital version) is an inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe. The digital version includes PROFIBUS PA, an LCD display, and advanced diagnostic features.

Benefits

- Patented Active-Shield technology so measurement is unaffected by material buildup or nozzle interference in active shield section
- Performs in extremely abrasive conditions because of solid rod construction
- Push-button calibration, full-function diagnostics
- High sensitivity allows installation in a wide range of liquids, solids or slurry applications
- Integral LCD display allows for easy menu-driven setup
- PROFIBUS PA communication (SIMATIC PDM compatible)

Application

Pointek CLS300 digital version provides an integral LCD display for stand-alone use, with PROFIBUS PA communication (Profile version 3.0, Class B) when required. Solid-state switch alarm is standard.

The robust design of CLS300 makes it specifically applicable for heavy solids applications where abrasive materials occur as in the mining industry.

The fully potted electronics are unaffected by condensation, dust or vibration.

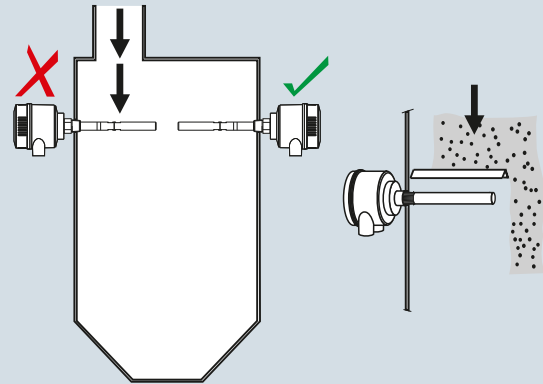
Wetted parts are made of stainless steel with a PFA shield for high chemical resistance, and of ceramic and stainless steel for high temperature version. Materials with low or high dielectric constants can be accurately detected. The unique Active Shield suppresses interference from material buildup or long installation nozzles.

The unique modular design of the Pointek CLS300 provides a wide range of configurations, process connections, extensions and approvals to meet the temperature and pressure requirements of specific applications. The modular design makes ordering easier and reduces stocking requirements. A wide range of probe configurations are available, including rod and cable versions.

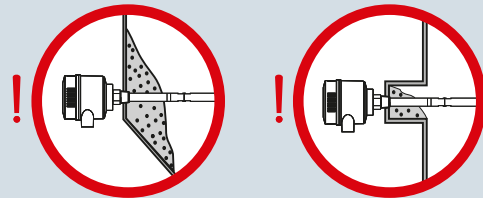
- Key Applications: liquids, slurries, bulk solids, relatively high pressure and temperature, hazardous areas, milling and mining applications

Configuration

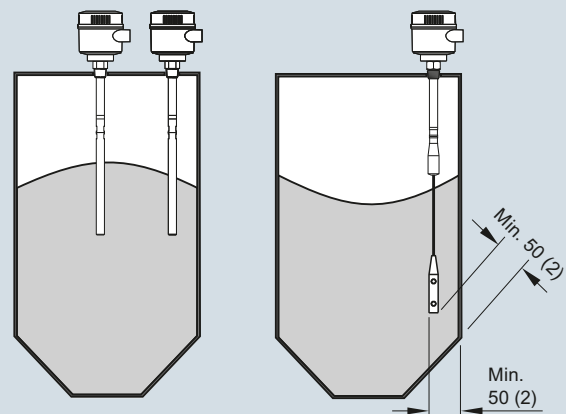
Installation



Keep unit out of path of falling material, or protect probe from falling material.



Build up of material in active shield area does not affect switch operation.



Install probe at least 50 (2) from tank wall.
Note angle of repose and adjust accordingly.

Pointek CLS300 installation, dimensions in mm (inch)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Digital

Technical specifications

Mode of operation		Controls and displays	
Measuring principle	Inverse frequency shift capacitive level detection	Local display	LCD
Input		Configuration	<ul style="list-style-type: none"> Locally, using 3 button keypad (for standalone operation) Remotely, using SIMATIC PDM (for installation on a network)
Measured variable	Change in picoFarad (pF)	Power supply	
Output		Bus voltage (at process connection)	<ul style="list-style-type: none"> Standard: 12 ... 30 V DC Intrinsically Safe: 12 ... 24 V DC
Solid-state output	Galvanically isolated Against reversed polarity (bipolar)	Current consumption	12.5 mA
<ul style="list-style-type: none"> Output Protection Max. switching voltage 		Certificates and approvals	
<ul style="list-style-type: none"> Max. load current Voltage drop Time delay (pre or post switching) Fail-safe mode Connection 	<ul style="list-style-type: none"> 30 V (DC) 30 V peak (AC) 	General Purpose	CSA, FM, CE, RCM
Accuracy		Dust Ignition Proof	ATEX II 1/2 D, 2 D IP6X T100 °C
Resolution	1 % change in actual capacitance	Flameproof Enclosure With IS Probe	ATEX II 1/2 G EEx d[ia] IIC T6...T4 ATEX II 1/2 D T100 °C
<ul style="list-style-type: none"> Min. sensitivity (pF) Max. temperature error 	0.2 % of actual capacitance value	Dust Ignition Proof With IS Probe	CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Rated operating conditions¹⁾		Intrinsically Safe ⁴⁾	ATEX II 1 G EEx ia IIC T6...T4 ATEX II 1/2 D, 2 D IP6X T100 °C
Installation conditions	Indoor/outdoor	Non-incendive	CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4
Location		Communication	
Ambient conditions	-40 ... +85 °C (-40 ... +185 °F) ²⁾	Explosion Proof with IS Probe	CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 or T6
<ul style="list-style-type: none"> Ambient temperature 		PROFIBUS PA (IEC 61158 CPF3 CP3/2) Bus physical layer: IEC 61158-2 MBP-(IS) Device profile: PROFIBUS PA profile for Process Control Devices Version 3.0, Class B FISCO field device	
Medium conditions	Liquids, bulk solids, slurries and interfaces, and applications with viscous materials	Marine	Lloyds Register of Shipping, Categories ENV1, ENV2 and ENV5
<ul style="list-style-type: none"> Relative dielectric constant ϵ_r Process temperature - Rod/Cable version - High Temperature version Process pressure³⁾ 	Min. 1.5	Others	Pattern Approval (China)
Design			
Material (enclosure)	Powder-coated aluminum with gasket		
Degree of protection	Standard: Type 4/NEMA 4/IP65 Optional: Type 4/NEMA 4/IP68		
Cable inlet	2 x M20x1.5 thread (option: 2 x 1/2" NPT conduit entry including 1 plugged entry)		

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate.
See also Pressure/Temperature curves starting on page 4/58.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F)

³⁾ Pressure rating of process seal is temperature dependent.
See Pressure/Temperature curves starting on page 4/58.

⁴⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection

Design: Probe

	Rod version	High Temperature version	Cable version
Length	Min. 250 mm (9.8 inch), max. 1 000 mm (40 inch)	Min. 250 mm (9.8 inch), max. 1 000 mm (40 inch)	Min. 1 000 mm (40 inch), max. 25 000 mm (984 inch)
Sensor wetted parts	PFA (no insulation on active probe), 316L stainless steel, PEEK isolators	Ceramic (ZrO ₂ ¹⁾ isolators (no insulation on active probe), 316L stainless steel	316 stainless steel, optional PFA, PEEK isolators
O-ring seal material	FKM (optional FFKM) ²⁾	Graphite ²⁾	FKM (optional FFKM) ²⁾
Thermal isolator	Optional	Standard	Optional
Extension	User selectable length	User selectable length	User selectable cable length

¹⁾ Zirconium Oxide

²⁾ For Caustic Materials, please contact ceg.smpi@siemens.com for alternative O-Rings

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Pointek CLS300 - Digital - Rod with Threaded or Flanged process connection Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5660-	Pointek CLS300 - Digital - Rod with Threaded or Flanged process connection Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.	7ML5660-
Process connection Threaded, 316L stainless steel ¾" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 A 1" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 B 1¼" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 C 1½" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 D R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 A R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 B R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] ● 1 D G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 A G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 B G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] ● 3 D		Add Order code Y01 and plain text: "Insertion length ... mm" Extended rod, factory adjusted length 250 ... 499 mm (9.8 ... 19.65 inch) ● E Extended rod, factory adjusted length 500 ... 749 mm (19.69 ... 29.49 inch) ● F Extended rod, factory adjusted length 750 ... 999 mm (29.53 ... 39.3 inch) ● G	
Welded flange, 316L stainless steel, raised face 1" ASME, 150 lb ● 5 A 1" ASME, 300 lb ● 5 B 1" ASME, 600 lb ● 5 C 1½" ASME, 150 lb ● 5 D 1½" ASME, 300 lb ● 5 E 1½" ASME, 600 lb ● 5 F 2" ASME, 150 lb ● 5 G 2" ASME, 300 lb ● 5 H 2" ASME, 600 lb ● 5 J 3" ASME, 150 lb ● 5 K 3" ASME, 300 lb ● 5 L 3" ASME, 600 lb ● 5 M 4" ASME, 150 lb ● 5 N 4" ASME, 300 lb ● 5 P 4" ASME, 600 lb ● 5 Q		Thermal isolator Without thermal isolator ● 0 With thermal isolator [for process connection temperatures over 85 °C (185 °F)] ● 1	
Welded flange, 316L stainless steel, Type A flat faced DN 25, PN 16 ● 6 A DN 25, PN 40 ● 6 B DN 40, PN 16 ● 6 C DN 40, PN 40 ● 6 D DN 50, PN 16 ● 6 E DN 50, PN 40 ● 6 F DN 80, PN 16 ● 6 G DN 80, PN 40 ● 6 H DN 100, PN 16 ● 6 J DN 100, PN 40 ● 6 K		Wetted seals FKM ● 0 FFKM [for process temperatures above -20 °C (-4 °F)] ● 1	
Probe length (length from flange face) (threaded lengths include process thread) Note: No Y01 needed in Order code for standard lengths Standard version, rod 350 mm (13.78 inch) ● A Extended rod, length 500 mm (19.69 inch) ● B Extended rod, length 750 mm (29.53 inch) ● C Extended rod, length 1 000 mm (39.37 inch) ● D		Probe material 316L stainless steel with PFA lining and PEEK isolators ● 0	
		Approvals Dust Ignition Proof: CE, RCM, ATEX II 1/2 D, 2 D IP6X T100 °C ● B Intrinsically Safe ¹⁾ CE, RCM, ATEX II 1 G EEx ia IIC T6...T4, ATEX II 1/2 D, 2 D IP6X T100 °C ● C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C ● D Dust Ignition Proof with IS Probe: CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 ● E Intrinsically Safe ¹⁾ CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 ● F Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 ● G General Purpose (CSA, FM) ● H General Purpose (CSA, FM, CE, RCM) ● J	
		● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Digital

Selection and Ordering data	Article No.
Pointek CLS300 - Digital - Rod with Threaded or Flanged process connection Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.	7ML5660-
Enclosure and Lid Aluminum epoxy coated 2 x 1/2" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x 1/2" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68	A B C D
Active shield length Standard length - (125 mm threaded, 105 mm flanged) Extended shield - (250 mm threaded, 230 mm flanged) ²⁾ Extended shield - (400 mm threaded, 380 mm flanged) ³⁾	0 1 2
1) Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection 2) Available with Probe version options B ... D, F, G only [≥ 500 mm (19.69 inch)] 3) Available with Probe version options C, D, and, G only [≥ 750 mm (29.53 inch)]	
We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.	

Selection and Ordering data	Article No.
Pointek CLS300 - Digital - Cable with Threaded or Flanged process connection Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.	7ML5661-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection Threaded, 316L stainless steel 1/4" NPT [(Taper), ANSI/ASME B1.20.1] 1/2" NPT [(Taper), ANSI/ASME B1.20.1] R 1 1/2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 1 1/2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	0 C 0 D 1 D 3 D
Welded flange, 316L stainless steel, raised face 1 1/2" ASME, 150 lb 1 1/2" ASME, 300 lb 1 1/2" ASME, 600 lb 2" ASME, 150 lb 2" ASME, 300 lb 2" ASME, 600 lb 3" ASME, 150 lb 3" ASME, 300 lb 3" ASME, 600 lb 4" ASME, 150 lb 4" ASME, 300 lb 4" ASME, 600 lb	5 D 5 E 5 F 5 G 5 H 5 J 5 K 5 L 5 M 5 N 5 P 5 Q
Welded flange, 316L stainless steel, Type A flat faced DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 DN 100, PN 16 DN 100, PN 40 (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	6 C 6 D 6 E 6 F 6 G 6 H 6 J 6 K
Probe length (length from flange face) (threaded lengths include process thread) Note: No Y01 needed in Order code for <u>standard lengths</u> Extended cable, 3 000 mm (118.11 inch), length can be shortened by customer Extended cable, 6 000 mm (236.22 inch), length can be shortened by customer	A B
Add Order code Y01 and plain text: <u>"Insertion length ... mm"</u> Extended cable, 500 ... 1 000 mm (19.69 ... 39.37 inch) Extended cable, 1 001 ... 5 000 mm (39.41 ... 196.85 inch) Extended cable, 5 001 ... 10 000 mm (196.89 ... 393.70 inch) Extended cable, 10 001 ... 15 000 mm (393.74 ... 590.55 inch) Extended cable, 15 001 ... 20 000 mm (590.59 ... 787.40 inch) Extended cable, 20 001 ... 25 000 mm (787.44 ... 984.25 inch)	E F G H J K

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/57
Accessories	See page 4/57
We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.	

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
Pointek CLS300 - Digital - Cable with Threaded or Flanged process connection Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.	7ML5661- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description	Y01
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1	Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1	Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204	C11 C12
Probe material Bare 316L stainless steel cable, PEEK isolators and 316L stainless steel cable weight PFA coated cable, PEEK isolators and 316L stainless steel cable weight	0 1	Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/57
Approvals Dust Ignition Proof: CE, RCM, ATEX II 1/2 D, 2 D IP6X T100 °C Intrinsically Safe ¹⁾ CE, RCM, ATEX II 1 G EEx ia IIC T6 ... T4, ATEX II 1/2 D, 2 D IP6X T100 °C Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6 ... T4, ATEX II 1/2 D T100 °C Intrinsically Safe ¹⁾ CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 General Purpose (CSA, FM) General Purpose (CSA, FM, CE, RCM)		Accessories We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.	See page 4/57
Enclosure and Lid Aluminum epoxy coated 2 x 1/2" NPT via adapter - cable inlet, IP65 2 x M20x1.5 cable inlet, IP65 2 x 1/2" NPT via adapter - cable inlet, IP68 2 x M20x1.5 cable inlet, IP68			B C D F G H J
Active shield length Standard length - (125 mm threaded, 105 mm flanged) Extended shield - 250 mm threaded, 230 mm flanged ²⁾ Extended shield - (400 mm threaded, 380 mm flanged) ²⁾	0 1 2		

¹⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection

²⁾ Available with Probe version options A, B and, F ... K only
 [≥ 1 000 mm (39.7 inch)]

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Digital

Selection and Ordering data	Article No.
Pointek CLS300 - Digital - High Temperature Rod version with Threaded or Flanged process connection	7ML5662-
Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection	
Threaded, 316L stainless steel	
¾" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
1½" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
Welded flange, 316L stainless steel, raised face	
1" ASME, 150 lb	5 A
1" ASME, 300 lb	5 B
1" ASME, 600 lb	5 C
1½" ASME, 150 lb	5 D
1½" ASME, 300 lb	5 E
1½" ASME, 600 lb	5 F
2" ASME, 150 lb	5 G
2" ASME, 300 lb	5 H
2" ASME, 600 lb	5 J
3" ASME, 150 lb	5 K
3" ASME, 300 lb	5 L
3" ASME, 600 lb	5 M
4" ASME, 150 lb	5 N
4" ASME, 300 lb	5 P
4" ASME, 600 lb	5 Q
Welded flange, 316L stainless steel, Type A flat faced	
DN 25, PN 16	6 A
DN 25, PN 40	6 B
DN 40, PN 16	6 C
DN 40, PN 40	6 D
DN 50, PN 16	6 E
DN 50, PN 40	6 F
DN 80, PN 16	6 G
DN 80, PN 40	6 H
DN 100, PN 16	6 J
DN 100, PN 40	6 K
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	
Probe length (length from flange face) (threaded lengths include process thread)	
Note: No Y01 needed in Order code for standard lengths	
Standard version, rod 350 mm (13.78 inch)	A
Extended rod, length 500 mm (19.69 inch)	B
Extended rod, length 750 mm (29.53 inch)	C
Extended rod, length 1 000 mm (39.37 inch)	D

Selection and Ordering data	Article No.
Pointek CLS300 - Digital - High Temperature Rod version with Threaded or Flanged process connection	7ML5662-
Inverse frequency shift capacitance level and material detection switch with optional rod/cable choices and configurable output. It is ideal for detecting liquids, solids, slurries, foam, and interfaces in demanding conditions where high pressure and temperatures are present and has the ability to tune out build-up on the probe.	
Add Order code Y01 and plain text: "Insertion length ... mm"	
Extended rod, factory adjusted length 250 ... 499 mm (9.8 ... 19.65 inch)	E
Extended rod, factory adjusted length 500 ... 749 mm (19.69 ... 29.49 inch)	F
Extended rod, factory adjusted length 750 ... 999 mm (29.53 ... 39.3 inch)	G
Wetted seals	
Graphite	0
Probe material	
316L stainless steel with ceramic (ZrO ₂) isolators	0
Approvals	
Dust Ignition Proof: CE, RCM, ATEX II 1/2 D, 2 D IP6X T100 °C	B
Intrinsically Safe ¹⁾ CE, RCM, ATEX II 1 G EEx ia IIC T6...T4, ATEX II 1/2 D, 2 D IP6X T100 °C	C
Flameproof Enclosure with IS Probe: CE, RCM, ATEX II 1/2 G EEx d[ia] IIC T6...T4, ATEX II 1/2 D T100 °C	D
Intrinsically Safe ¹⁾ CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	F
Explosion Proof Enclosure with IS Probe: CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	G
General Purpose (CSA, FM)	H
General Purpose (CSA, FM, CE, RCM)	J
Enclosure and Lid	
Aluminum epoxy coated	
2 x ½" NPT via adapter - cable inlet, IP65	A
2 x M20x1.5 cable inlet, IP65	B
2 x ½" NPT via adapter - cable inlet, IP68	C
2 x M20x1.5 cable inlet, IP68	D
Active shield length	
Standard length - (125 mm threaded, 105 mm flanged)	0
Extended shield - (250 mm threaded, 230 mm flanged) ²⁾	1
Extended shield - (400 mm threaded, 380 mm flanged) ³⁾	2
¹⁾ Barrier or Intrinsically Safe power supply required for Intrinsically Safe protection	
²⁾ Available with Probe version options B ... D, F, G only [≥ 500 mm (19.69 inch)]	
³⁾ Available with Probe version options C, D, and, G only [≥ 750 mm (29.53 inch)]	
➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.	

4

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard and Digital

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs		Operating Instructions - Standard	
Please add "-Z" to Article No. and specify Order code(s).		English	7ML1998-5JH04
Total insertion length: enter the total insertion length in plain text description	◆ Y01	German	7ML1998-5JH34
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	◆ Y15	Note: The Operating Instructions should be ordered as a separate line on the order.	
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	◆ C11	Quick Start manual, multi-language	A5E32221251
Inspection Certificate Type 3.1 per EN 10204	◆ C12	This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
Operating Instructions		Operating Instructions - Digital	
Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/57	English	7ML1998-5JJ05
		French	7ML1998-5JJ11
		German	7ML1998-5JJ34
Accessories	See page 4/57	Note: The Operating Instructions should be ordered as a separate line on the order.	
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.		Quick Start manual, multi-language	A5E32221496
		This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
		Accessories	
		One metallic cable gland M20x1.5, -40 ... +80 °C (-40 ... +176 °F) with integrated shield connection (available for PROFIBUS PA)	7ML1930-1AQ
		<u>General Purpose</u>	
		1/2" NPT General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 6 ... 12 mm (0.236 ... 0.472 inch)	7ML1830-1JA
		M20x1.5 General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 7 ... 12 mm (0.275 ... 0.472 inch)	7ML1830-1JC
		<u>Hazardous Locations</u>	
		1/2" NPT EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22, and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JB
		M20 EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22 and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JD
		Blind threaded flanges are available. Please contact ceg.smpi@siemens.com with a completed application data sheet on page 4/11	
		Pointek Specials	See page 4/80

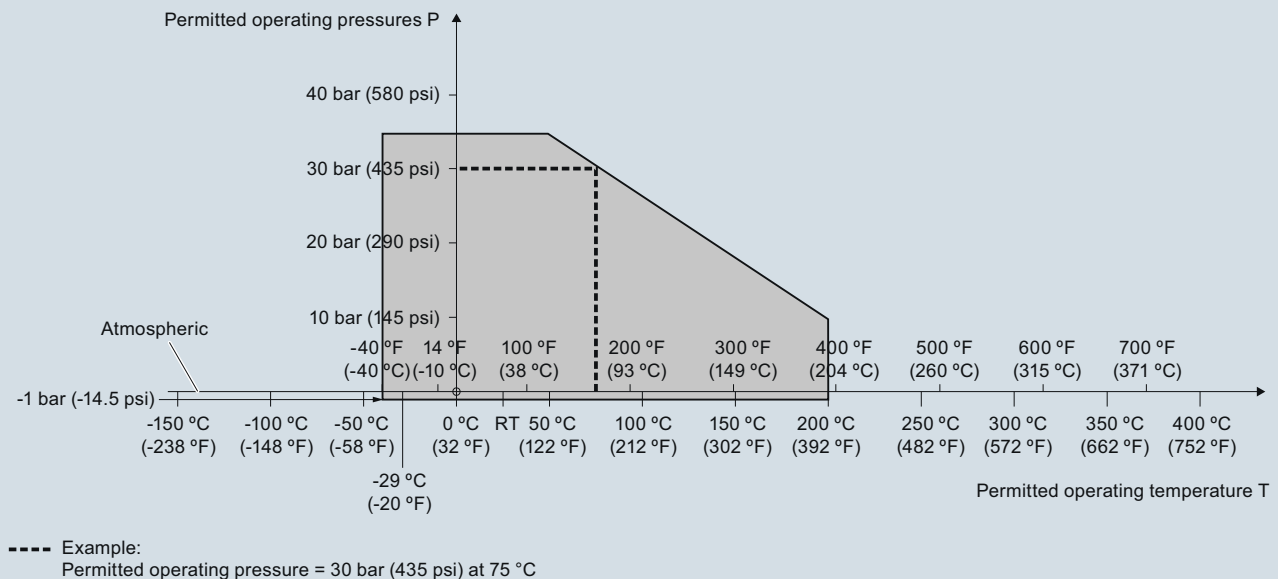
Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard and Digital

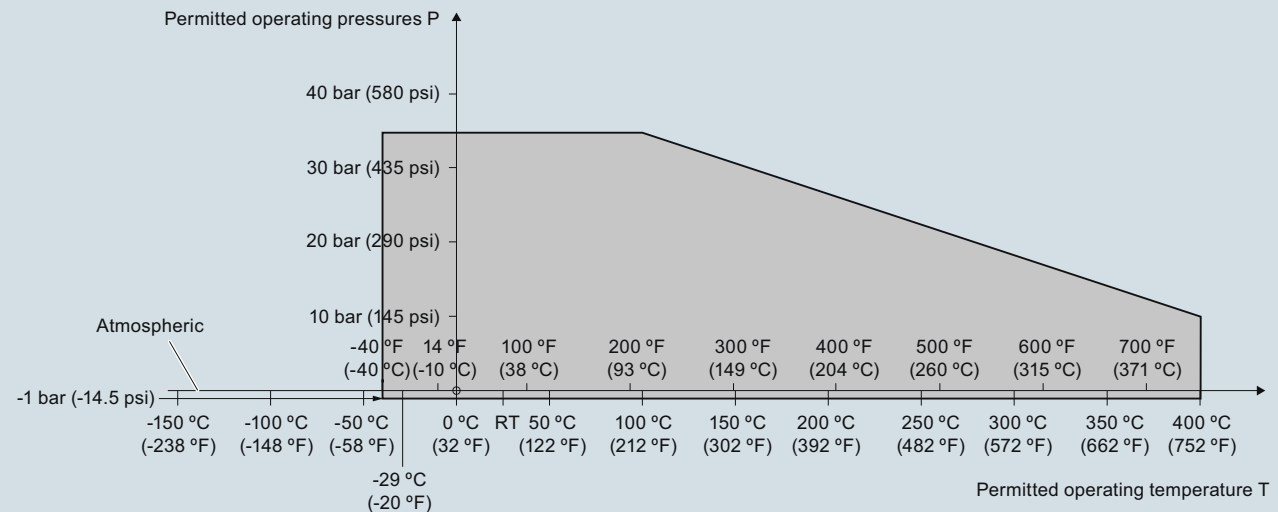
Characteristic curves

Pressure/temperature curve
CLS300 extended rod and cable probes
Threaded process connections
(7ML5650, 7ML5651, 7ML5660 and 7ML5661)



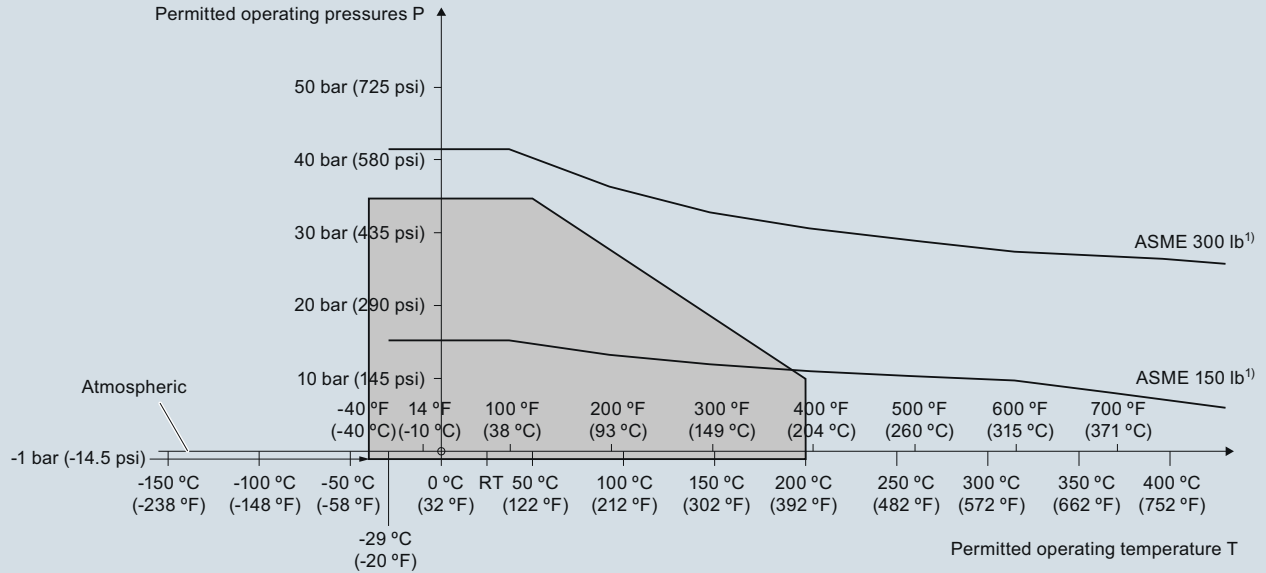
Pointek CLS300 Process Pressure/Temperature derating curves (7ML5650, 7ML5651, 7ML5660 and 7ML5661)

Pressure/temperature curve
CLS300 high temperature rod probes
Threaded process connections
(7ML5652 and 7ML5662)



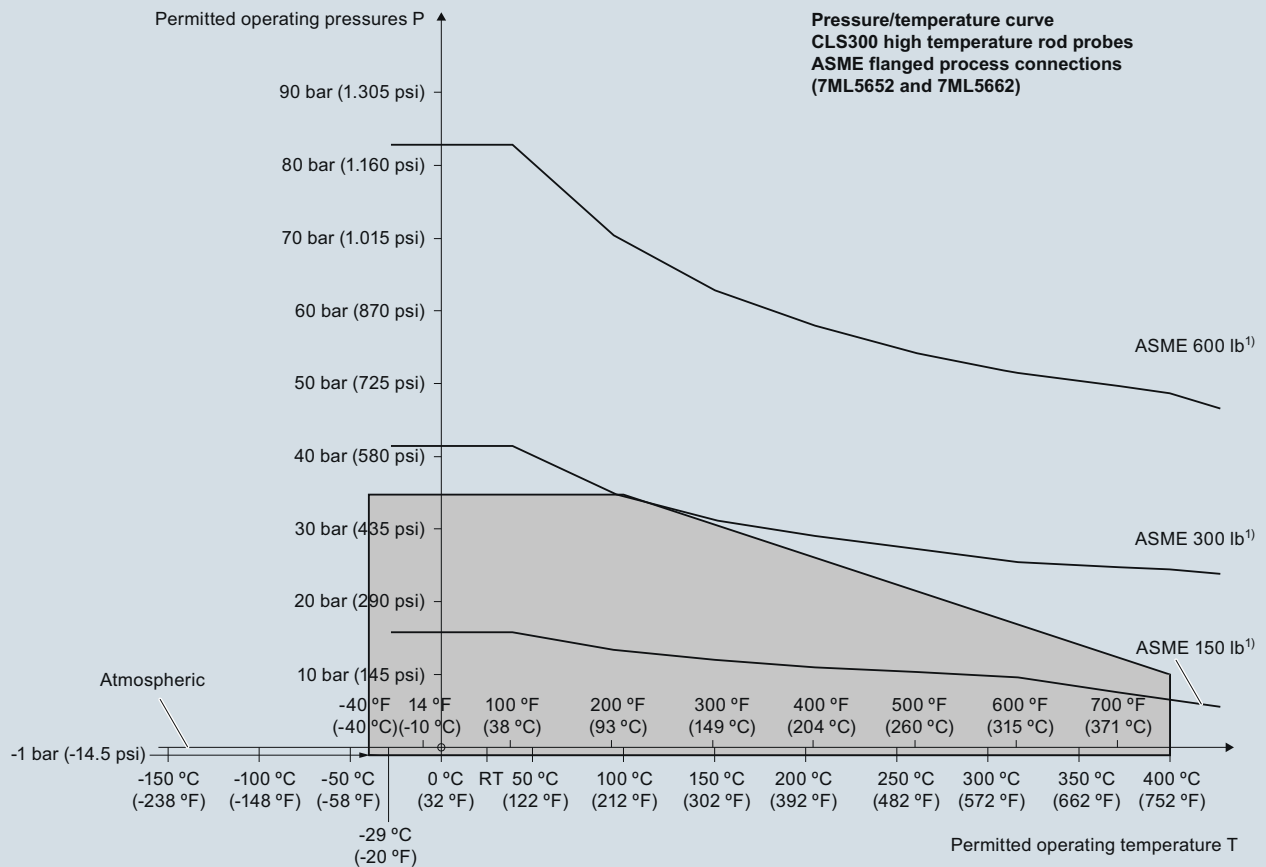
Pointek CLS300 Process Pressure/Temperature derating curves (7ML5652 and 7ML5662)

**Pressure/temperature curve
CLS300 extended rod and cable probes
ASME flanged process connections
(7ML5650, 7ML5651, 7ML5660 and 7ML5661)**



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

Pointek CLS300 Process Pressure/Temperature derating curves (7ML5650, 7ML5651, 7ML5660, and 7ML5661)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

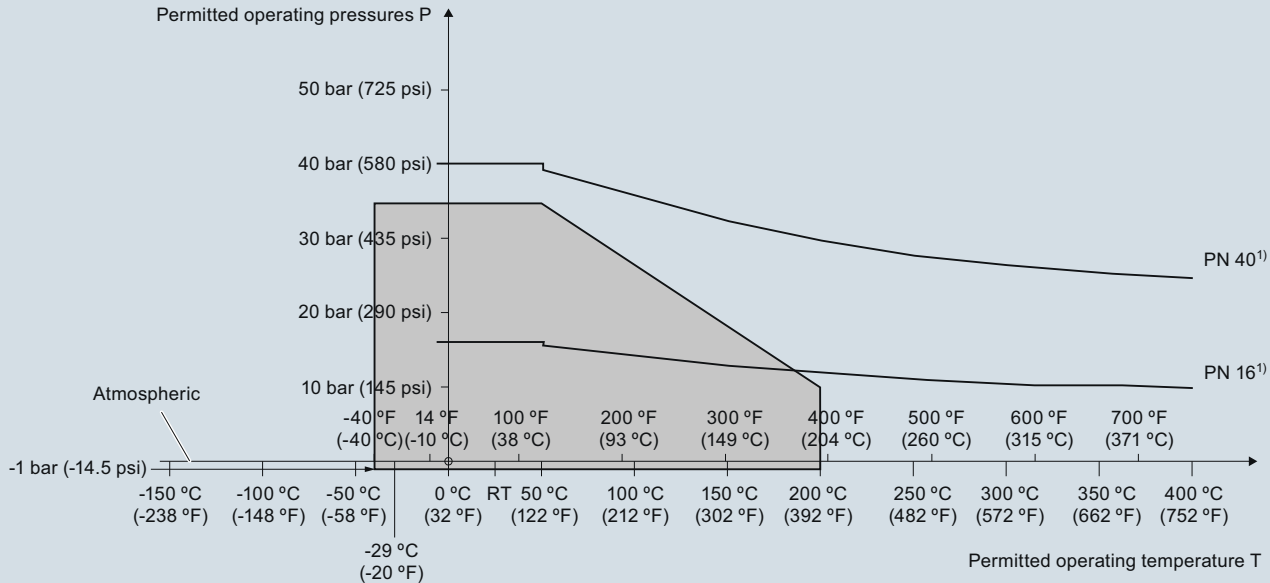
Pointek CLS300 Process Pressure/Temperature derating curves (7ML5652 and 7ML5662)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS300 – Standard and Digital

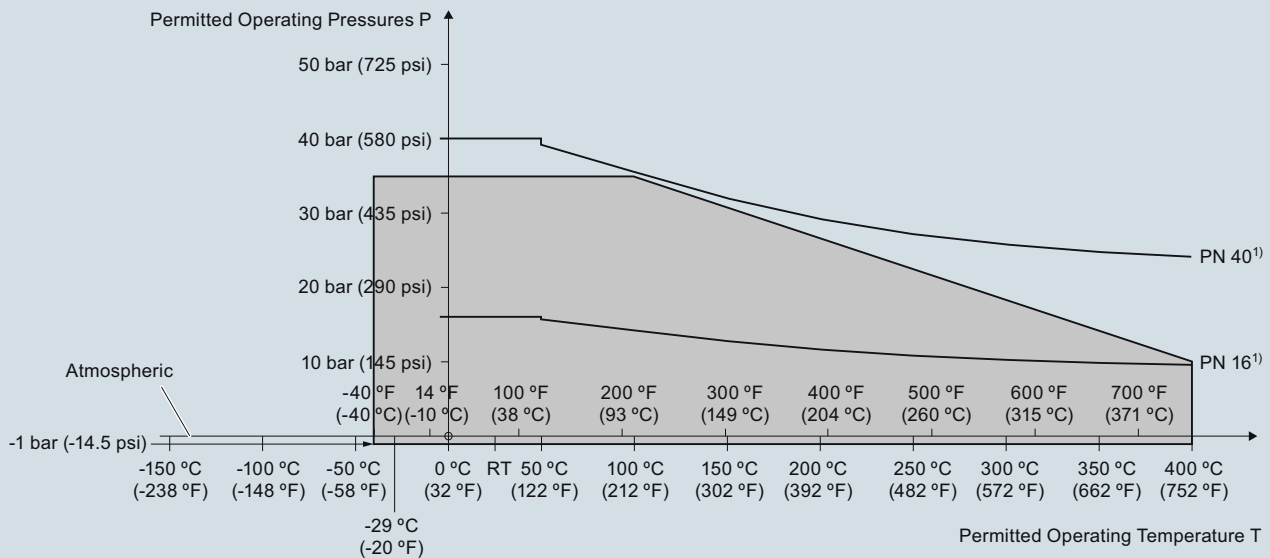
Pressure/temperature curve
CLS300 extended rod and cable probes
EN flanged process connections
(7ML5650, 7ML5651, 7ML5660 and 7ML5661)



1) The curve denotes the minimum allowable flange class for the shaded area below.

Pointek CLS300 Process Pressure/Temperature derating curves (7ML5650, 7ML5651, 7ML5660 and 7ML5661)

Pressure/Temperature Curve
CLS300 High Temperature Rod Probes
EN Flanged Process Connections (7ML5652 and 7ML5662)

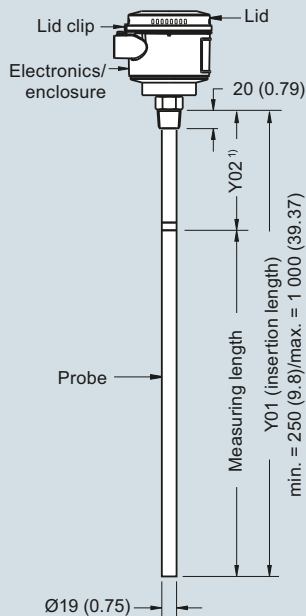


1) The curve denotes the minimum allowable flange class for the shaded area below.

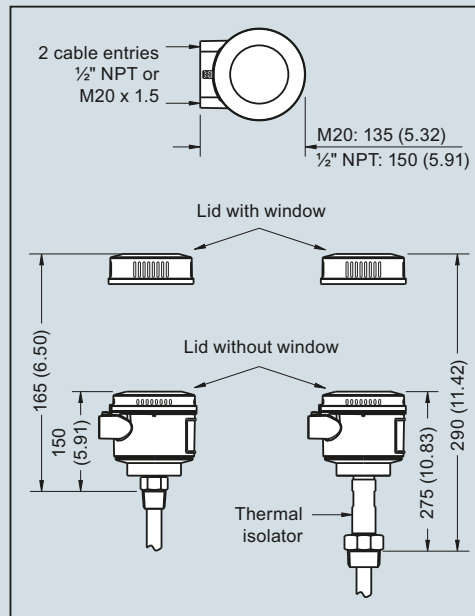
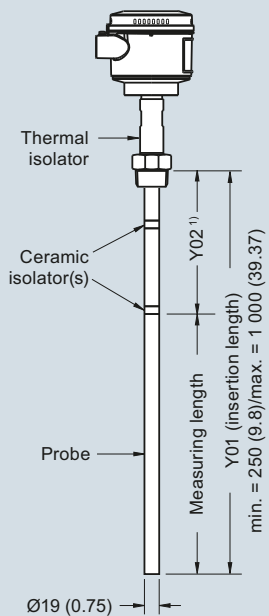
Pointek CLS300 Process Pressure/Temperature derating curves (7ML5652 and 7ML5662)

Dimensional drawings

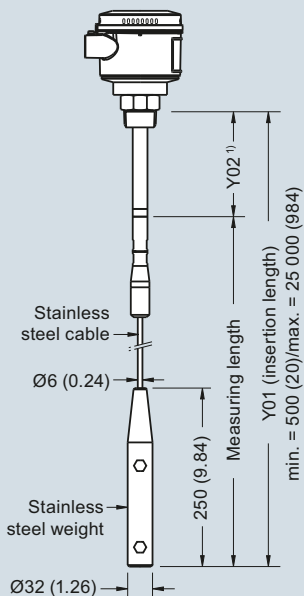
Rod version
Threaded (7ML5650 and 7ML5660)



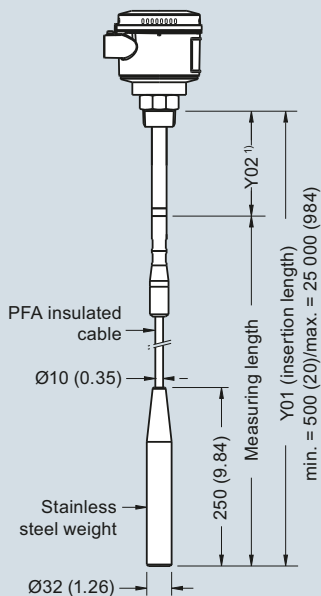
High temperature rod version
Threaded (7ML5652 and 7ML5662)



Cable version, non-insulated
Threaded (7ML5651 and 7ML5661)



Cable version, insulated
Threaded (7ML5651 and 7ML5661)



Note:

¹⁾ Extended Active Shield (Y02): standard length 125 (4.92). Optional active shield lengths: 250 (9.84) or 400 (15.75).

Pointek CLS300 - Threaded Process Connections, dimensions in mm (inch)

Level Measurement

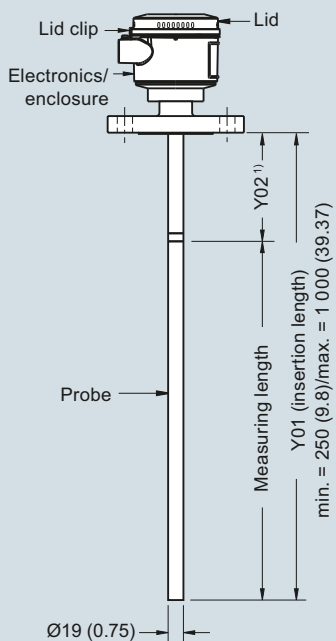
Point level measurement – Capacitance switches

Pointek CLS300 – Standard and Digital

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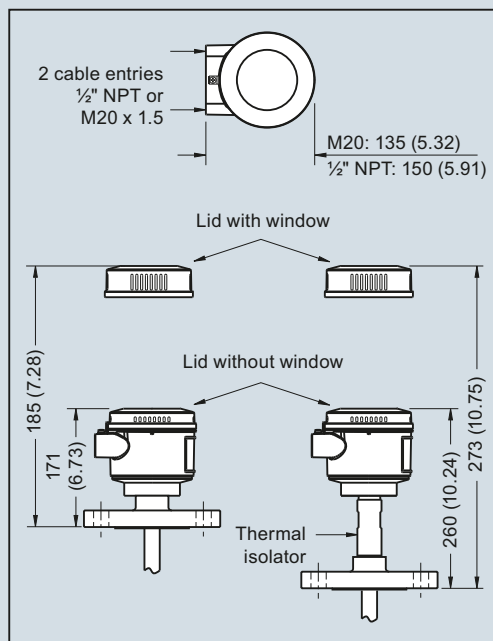
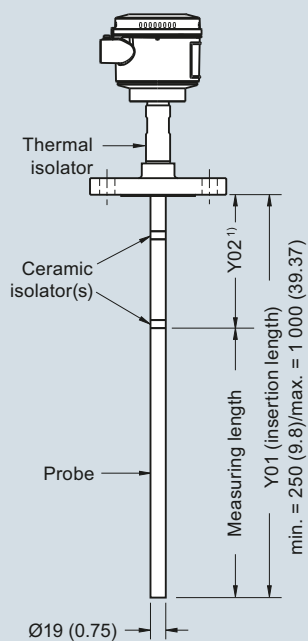
Rod version

Welded flange (7ML5650 and 7ML5660)



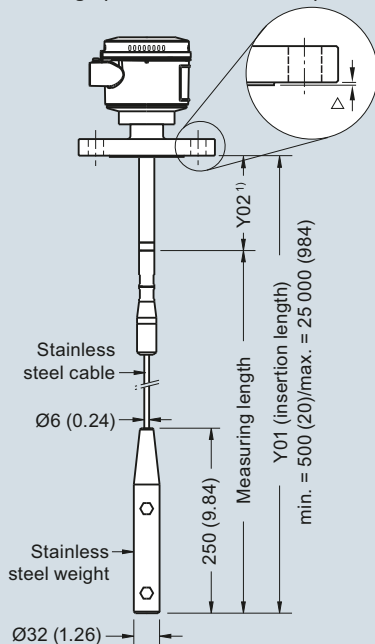
High temperature rod version

Welded flange (7ML5652 and 7ML5662)



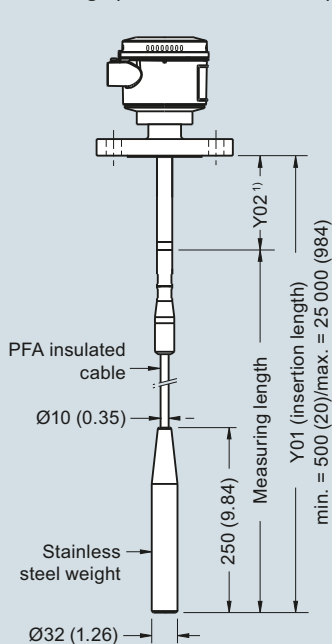
Cable version, non-insulated

Welded flange (7ML5651 and 7ML5661)



Cable version, insulated

Welded flange (7ML5651 and 7ML5661)



Flange Facing (raised face)	
Flange Class	Facing thickness
△ ASME 150/300	2 (0.08)
△ ASME 600/900	7 (0.28)
△ PN16/40	2 (0.08)

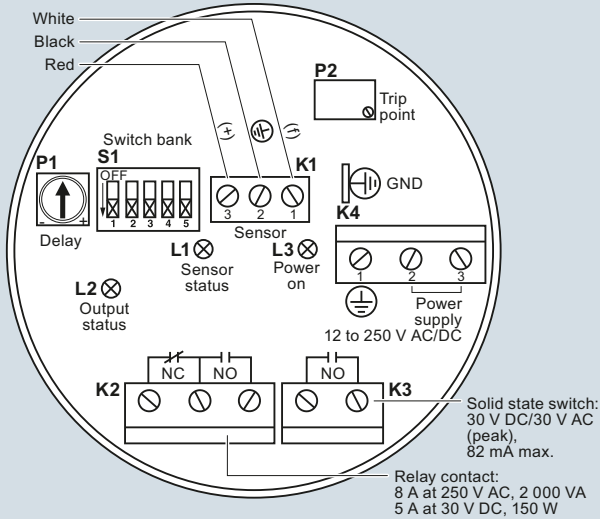
Note:

¹⁾ Extended Active Shield (Y02): standard length 105 (4.13). Optional active shield lengths: 230 (9.06) or 380 (14.96). Insertion length does not include any raised face/gasket face dimension (see Flange Facing Table above)

Pointek CLS300 - Flanged Process Connections, dimensions in mm (inch)

Schematics

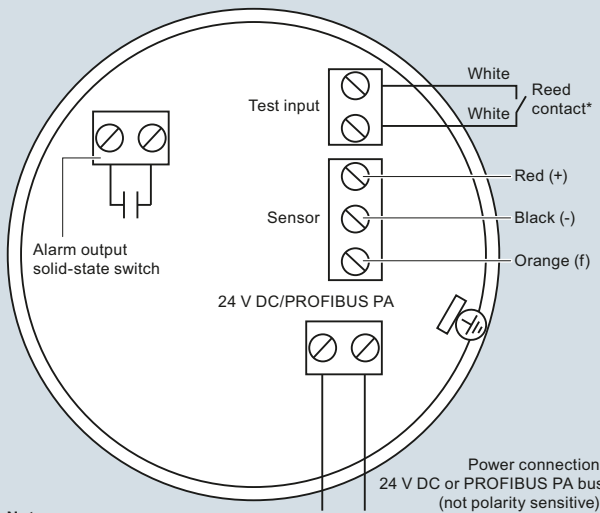
Wiring: Pointek CLS300 standard



Notes:

- Identification label is on underside of lid. Switch and potentiometer settings are for illustration purposes only (refer to operation/setup in manual).
- All field wiring must have insulation suitable for at least 250 V.
- Relay contact terminals are for use with equipment having no accessible live parts and wiring having insulation suitable for at least 250 V.
- Maximum working voltage between adjacent relay contacts shall be 250 V.
- Refer to the Instruction manual or contact Siemens representative for detailed wiring information.

Wiring: Pointek CLS300 digital



Notes:

Refer to the instruction manual or contact a Siemens representative for detailed wiring information.

***Magnet activated sensor test**

A magnet can be used to test the sensor without opening the lid of the Pointek CLS300 digital version. Bring the magnet close to the test area indicated on the enclosure. The sensor test starts and finishes automatically after 10 seconds.



Pointek CLS300 connection

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS500

Overview



Pointek CLS500 is an inverse frequency shift capacitance level and material detection switch ideal for detecting interfaces, solids, liquids, toxic, and aggressive chemicals in critical conditions of high temperature and pressure. CLS500 also has the ability to tune out build-up on the probe.

Benefits

- Patented Active-Shield technology so measurement is unaffected by material buildup in active shield section
- 2-wire loop powered with solid-state switch or 4 to 20/20 to 4 mA output
- Simple push-button calibration and integrated local display
- Full function diagnostics
- HART communications for remote commissioning and inspection

Application

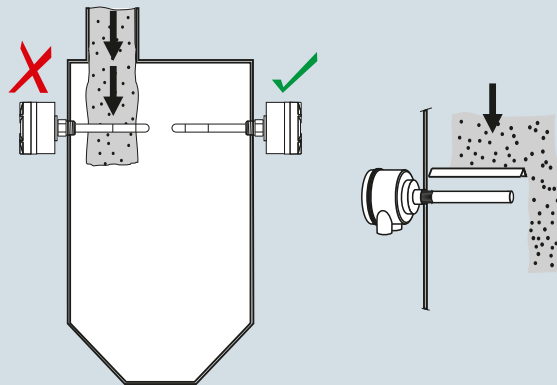
Patented Active-Shield technology ensures that measurement is unaffected by vapors, product deposits, dust and condensation. The unique mechanical probe design coupled with a high performance transmitter gives superior performance in a wide range of level detection applications.

Pointek CLS500's microprocessor-based electronics provide one-point calibration, making setup possible without shutting down your production process.

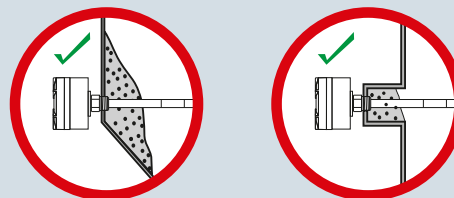
- Key Applications: foam or liquid/foam level, glycol regenerators, high-pressure coalescers, LNG applications

Configuration

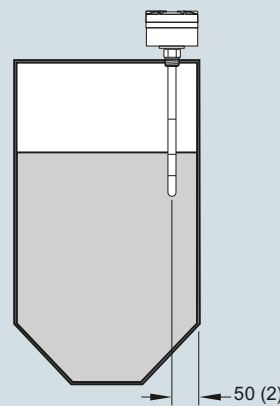
Installation



Keep unit out of path of falling material, or protect probe from falling material.



Build up of material in active shield area does not affect switch operation.



Install probe at least 50 (2) from tank wall.

Pointek CLS500 installation, dimensions in mm (inch)

Technical specifications

Input		
Measuring range	0 ... 330 pF	
Span	Min. 1 pF	
Output		
Solid-state switch		
• Output	Galvanically isolated	
• Protection	Against reversed polarity (bipolar)	
• Max. switching voltage	<ul style="list-style-type: none"> • 30 V (DC) • 30 V peak (AC) 	
• Max. load current	82 mA	
• Voltage drop	< 1 V, typical at 50 mA	
• Time delay (pre or post switching)	1 ... 60 s	
Current loop	4 ... 20 mA/20 ... 4 mA	
Accuracy (transmitter)		
Temperature stability	0.15 pF (0 pF) or < 0.25 % (typical < 0.1 %) of actual measurement value, whichever is greater over the full temperature range	
Non-linearity and repeatability	0.1 % of full scale and actual measurement respectively	
Accuracy	Deviation < 0.1 % of measured value	
Rated operating conditions¹⁾		
Installation conditions		
- Location	Indoor/outdoor	
Ambient conditions		
• Ambient temperature (transmitter)	-40 ... +85 °C (-40 ... +185 °F) ²⁾	
• Installation category	I	
• Pollution degree	4	
Medium conditions		
• Relative dielectric constant ϵ_r	Min. 1.5	
• Process temperature	Temperature ratings are pressure dependent. See Pressure/Temperature curves on page 4/72.	
- Standard (PFA)	-50 ... +200 °C (-58 ... +392 °F)	
- High temperature stainless steel version with thermal isolator	-60 ... +400 °C (-76 ... +752 °F)	
- Cryogenic version	-200 ... +200 °C (-328 ... +392 °F)	
	Contact ceg.smpi@siemens.com for details.	
Process pressure	Pressure rating of process seal is temperature dependent. See Pressure/Temperature curves on page 4/72.	
• Standard (PFA)	-1 ... +150 bar g (-14.6 ... +2 175 psi g)	
• High temperature version (Stainless steel)	-1 ... +35 bar g (-14.6 ... +507.6 psi g)	
Design		
Material		
• Wetted parts material		316L stainless steel
- Standard rod		PFA
• Probe isolation (rod)		
Probe diameter		
• Standard rod version (PFA)		16 mm (0.63 inch)
• High temperature rod version (Stainless steel)		19 mm (0.75 inch)
Probe length		
• Standard rod version (PFA)		Max. 1 000 mm (39.4 inch) with 16 mm (0.63 inch) diameter probe
• High temperature rod version (Stainless steel)		Max. measuring length 1 000 mm (39.4 inch) with 19 mm (0.75 inch) diameter probe
Process connection of probe		
• Threaded mounting		NPT [(Taper), ANSI/ASME B1.20.1] R [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]
• Flange mounting		ASME, EN 1092-1
Enclosure		
• Material		Aluminum, epoxy-coated (Stainless steel option available. Contact ceg.smpi@siemens.com)
• Cable inlet		2 x 1/2" NPT
• Degree of protection		Type 4X/NEMA4X/IP65, IP68
Power supply		Max. 33 V DC
Features		
Measurement current signaling		NAMUR NE 43
Safety		<ul style="list-style-type: none"> • Inputs/outputs fully galvanically isolated • Polarity-insensitive current loop • Fully potted • Integrated safety barrier
• Diagnostics with fault alarm when:		Primary variable (PV) out of limits, system failure in measurement circuit, deviation between A/D and D/A converter, check sum, watch dog and self-checking facility
• Function rotary switch		Positions 0 ... 9, A ... F
• SMART communication		Conforming to HART Communication Foundation (HCF)
Certificates and approvals		
• General Purpose		CE, CSA/FM, RCM
• Non incensive/Non sparking		CSA/FM Class I, Div. 2, Groups A, B, C, D T4 ATEX II 3G 2D EEx n A [ib] IIC T6 ... T4 T100 °C
• Dust Ignition Proof		CSA/FM Class II and III, Div. 1, Groups E, F, G T4 ATEX II 1/2 GD EEx d [ia] T6 ... T1 T100 °C
• Explosion Proof		FM Class 1, Div. 1, Groups A, B, C, D T4 ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T100 °C
• Marine		Lloyds Register of Shipping, Categories ENV1, ENV2, ENV3, ENV5, Bureau Veritas

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves on page 4/72.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F)

Level Measurement

Point level measurement – Capacitance switches

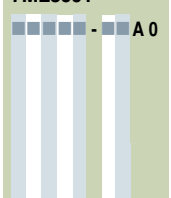
Pointek CLS500

Pointek CLS500 probe version	Standard	HT Series
Process connection types	Standard (PFA) (7ML5601, 7ML5602, 7ML5603)	High Temperature (Stainless steel) (7ML5604)
Threaded	Available as standard	–
Flange	Available as standard	Available as standard
Process connection materials		
316L stainless steel	Available as standard	Available as standard
Probe insulation		
None	–	HT Stainless: available as standard
PFA	Available as standard	–
Length parameters		
Max. rod length	1 000 mm (40 inch)	1 000 mm (40 inch)
Process conditions¹⁾		
Max. process pressure	150 bar g (2 175 psi g)	Stainless steel: ²⁾ 35 bar g (507 psi g)
Max. process temperature	200 °C (392 °F)	400 °C (752 °F)

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate.
See also Pressure/Temperature curves on page 4/72. Pressure rating of process seal is temperature dependent.

²⁾ Pressure rating of process seal is temperature dependent. See Pressure/Temperature curves on page 4/72.

– Not available as standard

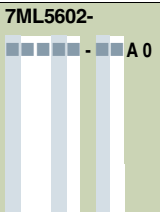
Selection and Ordering data	Article No.	Selection and Ordering data	Order code
Pointek CLS500, threaded Inverse frequency shift capacitance level and material detection switch for detecting interfaces, solids, liquids, toxic and aggressive chemicals in critical conditions of extreme temperature and pressure. CLS500 also has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5601- 	Further designs Please add "-Z" to Article No. and specify Order code(s).	
Electronic transmitter No transmitter supplied MSP 2002-1 (330 pF)	0 1	Total insertion length: enter the total insertion length in plain text description Active Shield length - minimum length is 50 mm Y02: to mm ¹⁾ Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204	Y01 Y02 Y15 C11 C12
Process connection ¾" 1" 1¼" 1½" 2"	A B C D E	Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/71
Threaded connection and rating NPT [(Taper), ANSI/ASME B1.20.1] R [(BSPT), EN 10226/PT (JIS-T) JIS B 0203] G [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	A B D	Pointek Specials	See page 4/71
Probe insulation/material of process connection PFA insulation/316L stainless steel	1	¹⁾ See dimension drawings on page 4/77 for further explanation of Y02	
Approvals General Purpose: CE, CSA/FM, RCM CSA/FM Class I, Div. 2, Groups A, B, C, D T4; ATEX II 3GD 2D EEx nA [ib] IIC T6 to T4 T100 °C; CSA/FM Class II and III Div. 1, Groups E, F, G T4 ATEX II 1/2 GD EEx d [ia] IIC T6 to T1 T100 °C FM Class I, Div. 1, Groups A, B, C, D T4	1 2 4 6		
Probe/electrode diameter 16 mm (0.63 inch) rigid rod, minimum insertion length 200 mm (7.9 inch), maximum insertion length 1 000 mm (39.4 inch) ¹⁾	1		
Thermal isolator/remote version Rigid thermal isolator [for process connection temperature over 85 °C (185 °F)] No thermal isolator	A B		

¹⁾ Add Order code Y01 and Y02 in plain text: "Insertion/active shield length to mm"

Level Measurement

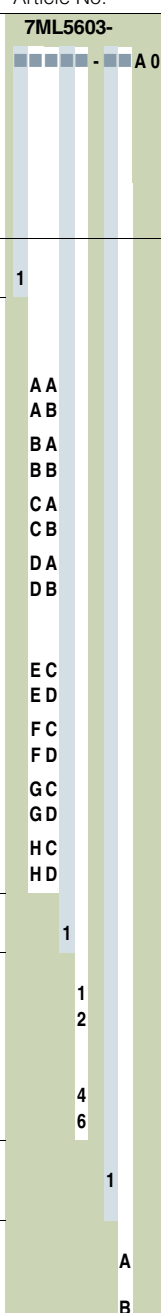
Point level measurement – Capacitance switches

Pointek CLS500

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
Pointek CLS500, welded flange Inverse frequency shift capacitance level and material detection switch for detecting interfaces, solids, liquids, toxic and aggressive chemicals in critical conditions of extreme temperature and pressure. CLS500 also has the ability to tune out build-up on the probe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5602- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description Active Shield length - minimum length is 50 mm. Y02: to mm ¹⁾ Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204	 Y01 Y02 Y15 C11 C12
Electronic transmitter MSP 2002-1 (330 pF)	1		
Process connection and pressure rating Welded flange, 316L stainless steel, raised face 2" ASME, 150 lb 2" ASME, 300 lb 3" ASME, 150 lb 3" ASME, 300 lb ¹⁾ 4" ASME, 150 lb ¹⁾ 4" ASME, 300 lb ¹⁾ 6" ASME, 150 lb ¹⁾ 6" ASME, 300 lb ¹⁾ Welded flange, 316L stainless steel, Type A flat faced DN 50 PN 16 DN 50 PN 40 DN 80 PN 16 DN 80 PN 40 DN 100 PN 16 ¹⁾ DN 125 PN 16 ¹⁾ (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)	AA AB BA BB CA CB DA DB EC ED FC FD GC HC		
Probe insulation/material of process connection PFA insulation/316L stainless steel	1		
Approvals General Purpose CSA/FM Class I, Div. 2, Groups A, B, C, D T4; ATEX II 3GD 2D EEx nA [ib] IIC T6 to T4 T100 °C; CSA/FM Class II and III Div. 1, Groups E, F, G T4 ATEX II 1/2 GD EEx d [ia] IIC T6 to T1 T100 °C FM Class I, Div. 1, Groups A, B, C, D T4	1 2 4 6		
Probe/electrode diameter 16 mm (0.63 inch) rigid rod, min. length 200 mm (7.9 inch), max. length 1 000 mm (39.4 inch)	1		
Thermal isolator Rigid thermal isolator [for process temperature over 85 °C (185 °F)] No thermal isolator	A B		
		Operating Instructions Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.	See page 4/71
		Pointek Specials	See page 4/71

¹⁾ See dimensional drawings on page 4/77 for further explanation of Y02

¹⁾ Custom shipping methods required. Contact factory for more details.

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
Pointek CLS500, single piece flange Inverse frequency shift capacitance level and material detection switch for detecting interfaces, solids, liquids, toxic and aggressive chemicals in critical conditions of extreme temperature and pressure. CLS500 also has the ability to tune out build-up on the probe. Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5603- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: enter the total insertion length in plain text description Active Shield length - minimum length is 50 mm. Y02: to mm ¹⁾ Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204	 Y01 Y02 Y15 C11 C12
Electronic transmitter MSP 2002-1 (330 pF)	1		
Process connection and pressure rating <u>Single piece flange, 316L stainless steel, raised face</u> 2" ASME, 150 lb 2" ASME, 300 lb 3" ASME, 150 lb 3" ASME, 300 lb ¹⁾ 4" ASME, 150 lb ¹⁾ 4" ASME, 300 lb ¹⁾ 6" ASME, 150 lb ¹⁾ 6" ASME, 300 lb ¹⁾ <u>Single piece flange, 316L stainless steel, Type B1 raised faced</u> DN 50 PN 16 DN 50 PN 25 DN 80 PN 16 DN 80 PN 25 DN 100 PN 16 ¹⁾ DN 100 PN 25 ¹⁾ DN 125 PN 16 ¹⁾ DN 125 PN 25 ¹⁾	AA AB BA BB CA CB DA DB EC ED FC FD GC GD HC HD		
Probe insulation/material of process connection PFA insulation/316L stainless steel	1		
Approvals General Purpose: CE, CSA/FM, RCM CSA/FM Class I, Div. 2, Groups A, B, C, D T4; ATEX II 3GD 2D EEx nA [ib] IIC T6 to T4 T100 °C; CSA/FM Class II and III Div. 1, Groups E, F, G T4 ATEX II 1/2 GD EEx d [ia] IIC T6 to T1 T100 °C FM Class I, Div. 1, Groups A, B, C, D T4	1 2 4 6		
Probe/electrode diameter 16 mm (0.63 inch) rigid rod, maximum length 1 000 mm (39.4 inch) (Y01)	1		
Thermal isolator Rigid thermal isolator [for process connection temperature over 85 °C (185 °F)] No thermal isolator	A B		

¹⁾ Custom shipping methods required. Contact factory for more details

Operating Instructions

Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and manual library.

Accessories

¹⁾ See dimensional drawings on page 4/77 for further explanation of Y02

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS500

Selection and Ordering data

Article No.

Pointek CLS500 High temperature

7ML5604-

Inverse frequency shift capacitance level and material detection switch for detecting interfaces, solids, liquids, toxic and aggressive chemicals in critical conditions of extreme temperature and pressure. CLS500 also has the ability to tune out build-up on the probe.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Electronic transmitter

MSP 2002-1 (330 pF)

1

Process connection and pressure rating

316L stainless steel, raised face¹⁾

2" ASME, 150 lb

A 1

2" ASME, 300 lb

A 2

2" ASME, 600 lb

A 3

2" ASME, 900 lb

A 4

3" ASME, 150 lb

B 1

3" ASME, 300 lb²⁾

B 2

3" ASME, 600 lb²⁾

B 3

3" ASME, 900 lb²⁾

B 4

4" ASME, 150 lb²⁾

C 1

4" ASME, 300 lb²⁾

C 2

4" ASME, 600 lb²⁾

C 3

4" ASME, 900 lb²⁾

C 4

6" ASME, 150 lb²⁾

D 1

6" ASME, 300 lb²⁾

D 2

6" ASME, 600 lb²⁾

D 3

6" ASME, 900 lb²⁾

D 4

316L stainless steel, Type B1 flat faced

DN 50 PN 16

E 1

DN 50 PN 25

E 2

DN 50 PN 40

E 3

DN 50 PN 63

E 4

DN 80 PN 16

F 1

DN 80 PN 25

F 2

DN 80 PN 40²⁾

F 3

DN 80 PN 63²⁾

F 4

DN 100 PN 16²⁾

G 1

DN 100 PN 25²⁾

G 2

DN 100 PN 40²⁾

G 3

DN 100 PN 64²⁾

G 4

DN 125 PN 16²⁾

H 1

DN 125 PN 25²⁾

H 2

DN 125 PN 40²⁾

H 3

DN 125 PN 64²⁾

H 4

(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.)

Selection and Ordering data

Article No.

Pointek CLS500 High temperature

7ML5604-

Inverse frequency shift capacitance level and material detection switch for detecting interfaces, solids, liquids, toxic and aggressive chemicals in critical conditions of extreme temperature and pressure. CLS500 also has the ability to tune out build-up on the probe.

Probe material of process connection

No insulation/316L stainless steel³⁾⁴⁾

1

Stilling well

No stilling well

0

Approvals

General Purpose

CSA/FM Class I, Div. 2, Groups A, B, C, D T4;
ATEX II 3GD 2D EEx nA [ib] IIC T6 to T4 T100 °C;
CSA/FM Class II and III Div. 1, Groups E, F, G T4

ATEX II 1/2 GD EEx d [ia] IIC T6 to T1 T100 °C

FM Class I, Div. 1, Groups A, B, C, D T4

Probe/electrode diameter

Maximum length 1 000 mm (39.37 inch)⁴⁾

A

Thermal isolator

Rigid thermal isolator [for process connection temperature over 85 °C (185 °F)]

1

¹⁾ Welded flange for no insulation option only

²⁾ Custom shipping methods required

³⁾ Non-conductive material only, stainless steel non-insulated probe diameter 19 mm (0.75 inch)

⁴⁾ Add Order code Y01 and Y02 in plain text:

"Insertion/active shield length to mm"

Minimum insertion length depends on probe version selected.

See dimensional drawings on page 4/77 for more details.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Total insertion length: enter the total insertion length in plain text description	Y01
Active Shield length - minimum length is 50 mm. Y02: to mm ¹⁾	Y02
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	
English	7ML1998-5GG03
German	7ML1998-5GG32
French	7ML1998-5GG11
Dutch	7ML1998-5GG41
Note: The Operating Instructions should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
Quick Start manual, multi-language	A5E32243995
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
Accessories	
<u>General Purpose</u>	
1/2" NPT General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 6 ... 12 mm (0.236 ... 0.472 inch)	7ML1830-1JA
M20x1.5 General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 7 ... 12 mm (0.275 ... 0.472 inch)	7ML1830-1JC
Transmitter, MSP 2002-1, 330 PF	7ML1830-1JP
<u>Hazardous Locations</u>	
1/2" NPT EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22, and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JB
M20 EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22 and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JD
Pointek Specials	See page 4/80

¹⁾ See dimensional drawings on page 4/77 for further explanation of Y02

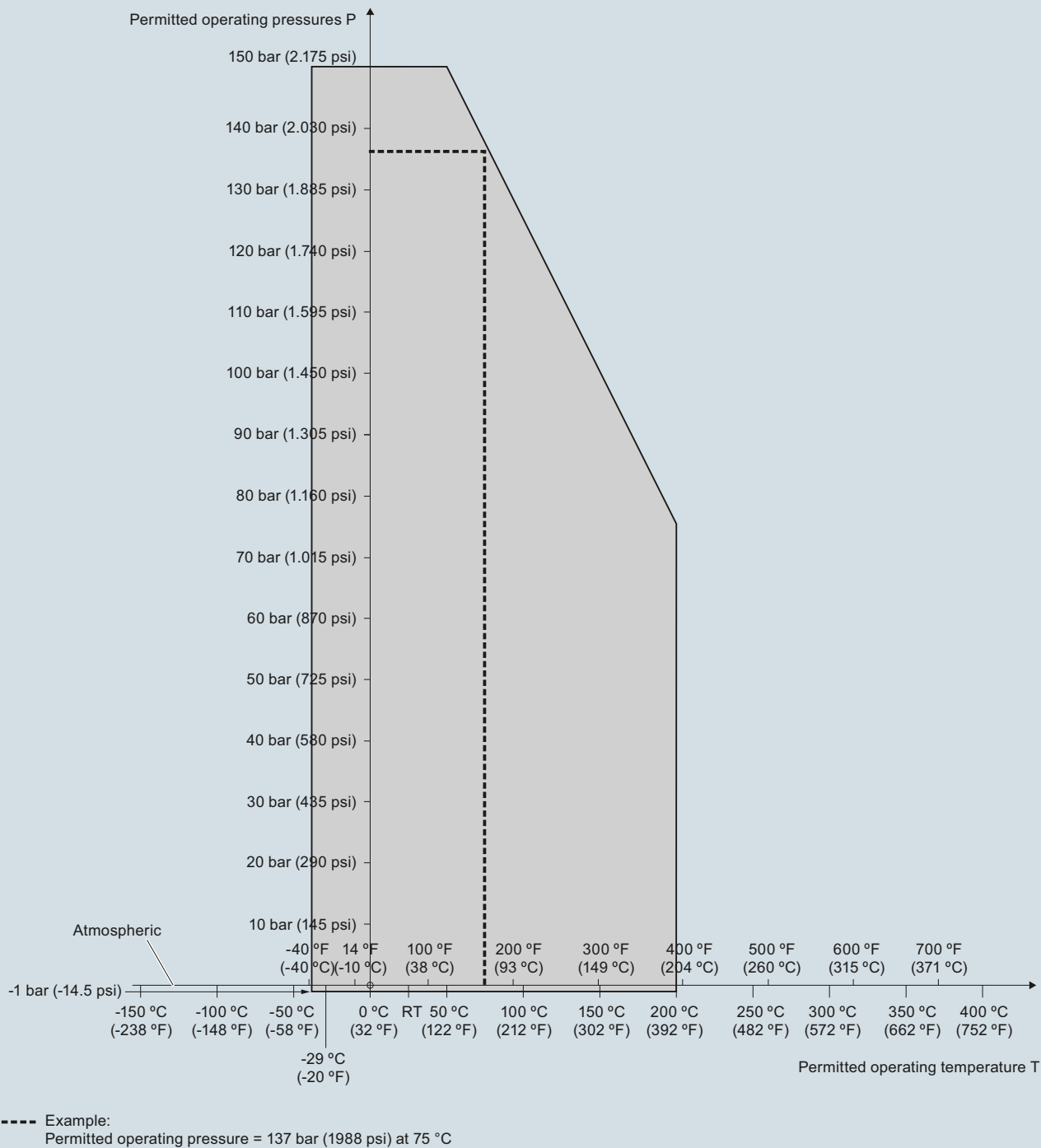
Level Measurement

Point level measurement – Capacitance switches

Pointek CLS500

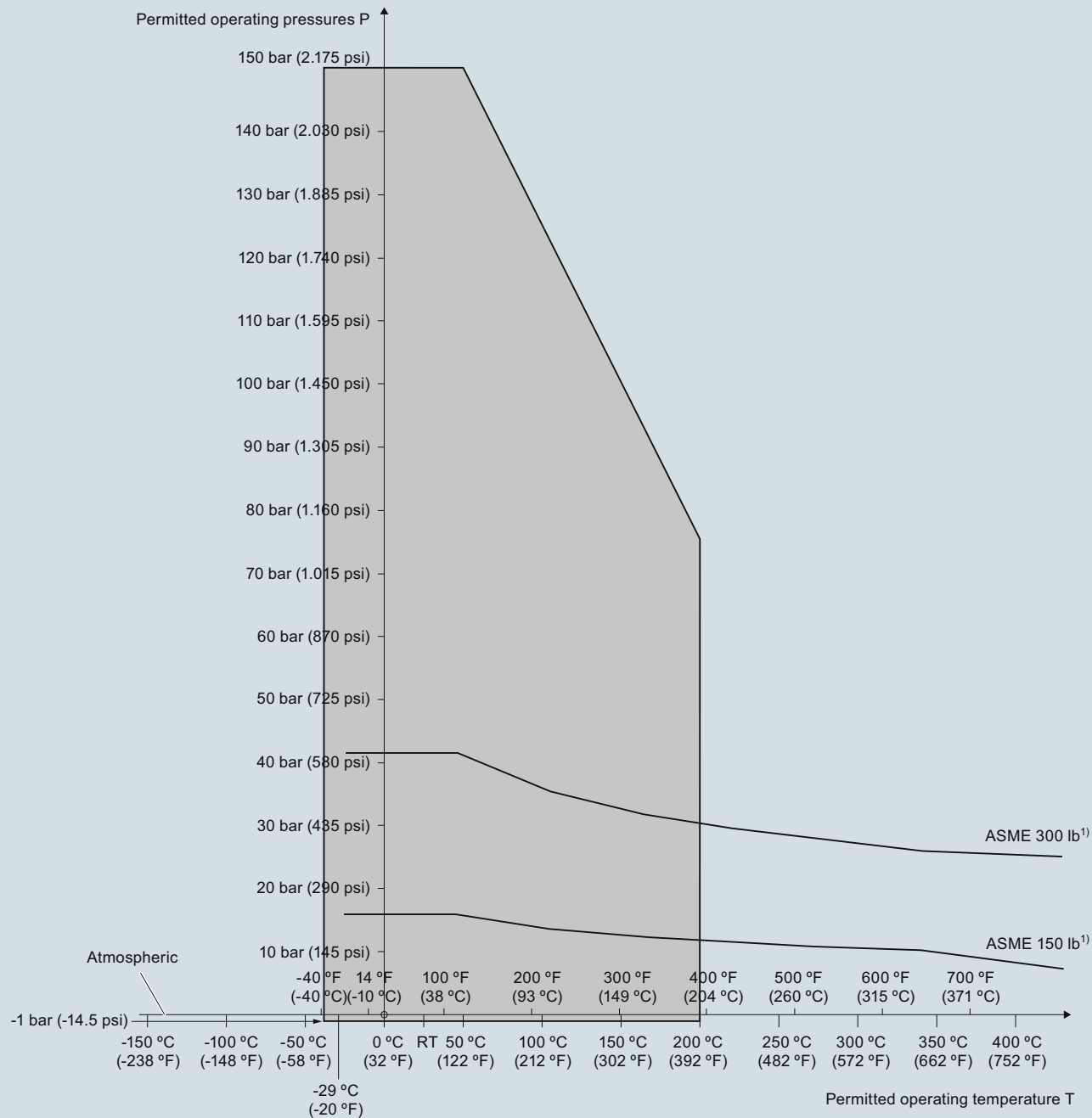
Characteristic curves

Pressure/temperature curve
CLS500 rod probes
Threaded process connections
(7ML5601)



Pointek CLS500 Process Pressure/Temperature derating curves (7ML5601)

Pressure/temperature curve
CLS500 rod probes
ASME flanged process connections
(7ML5602 and 7ML5603)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

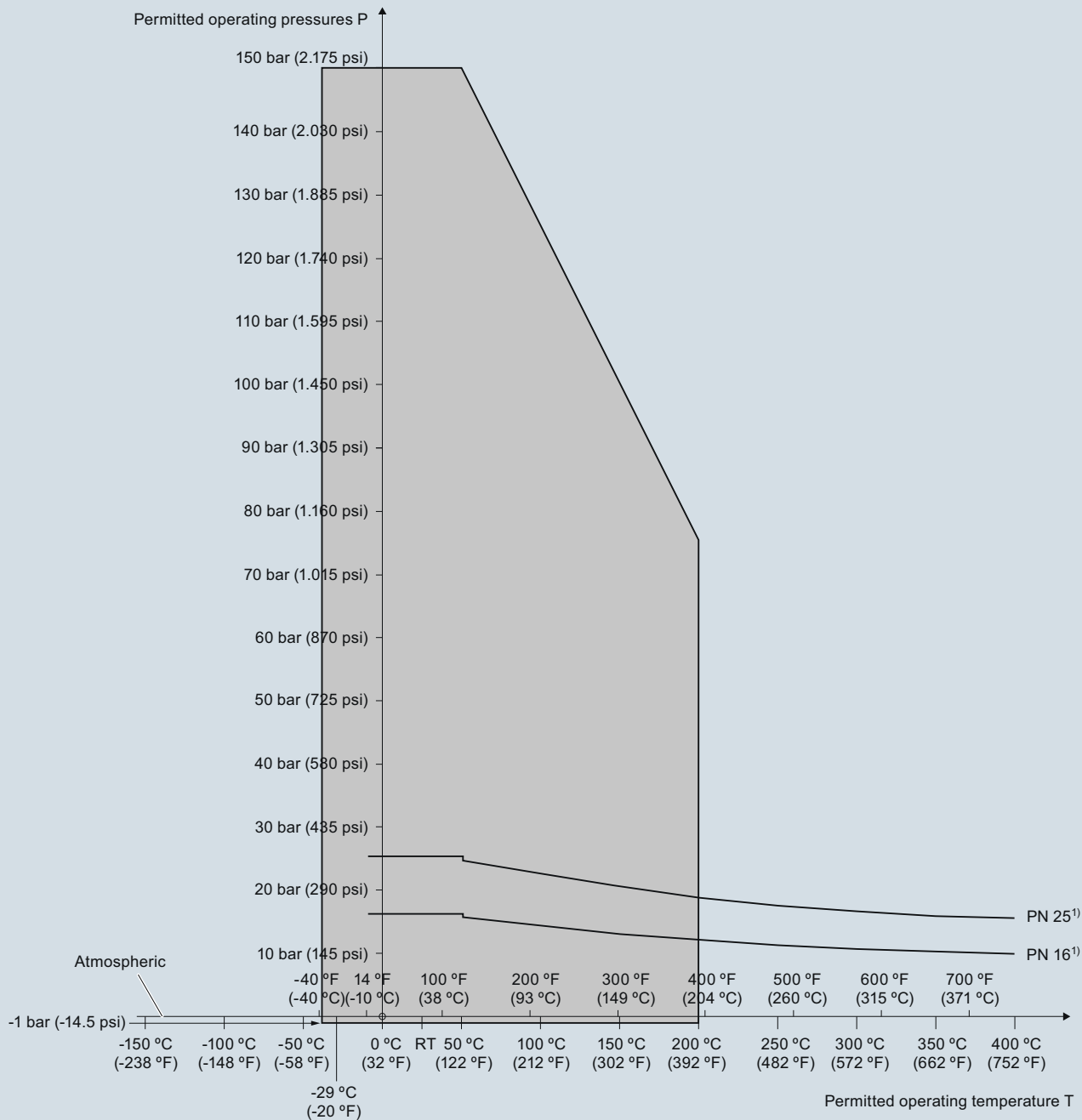
Pointek CLS500 Process Pressure/Temperature derating curves (7ML5602 and 7ML5603)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS500

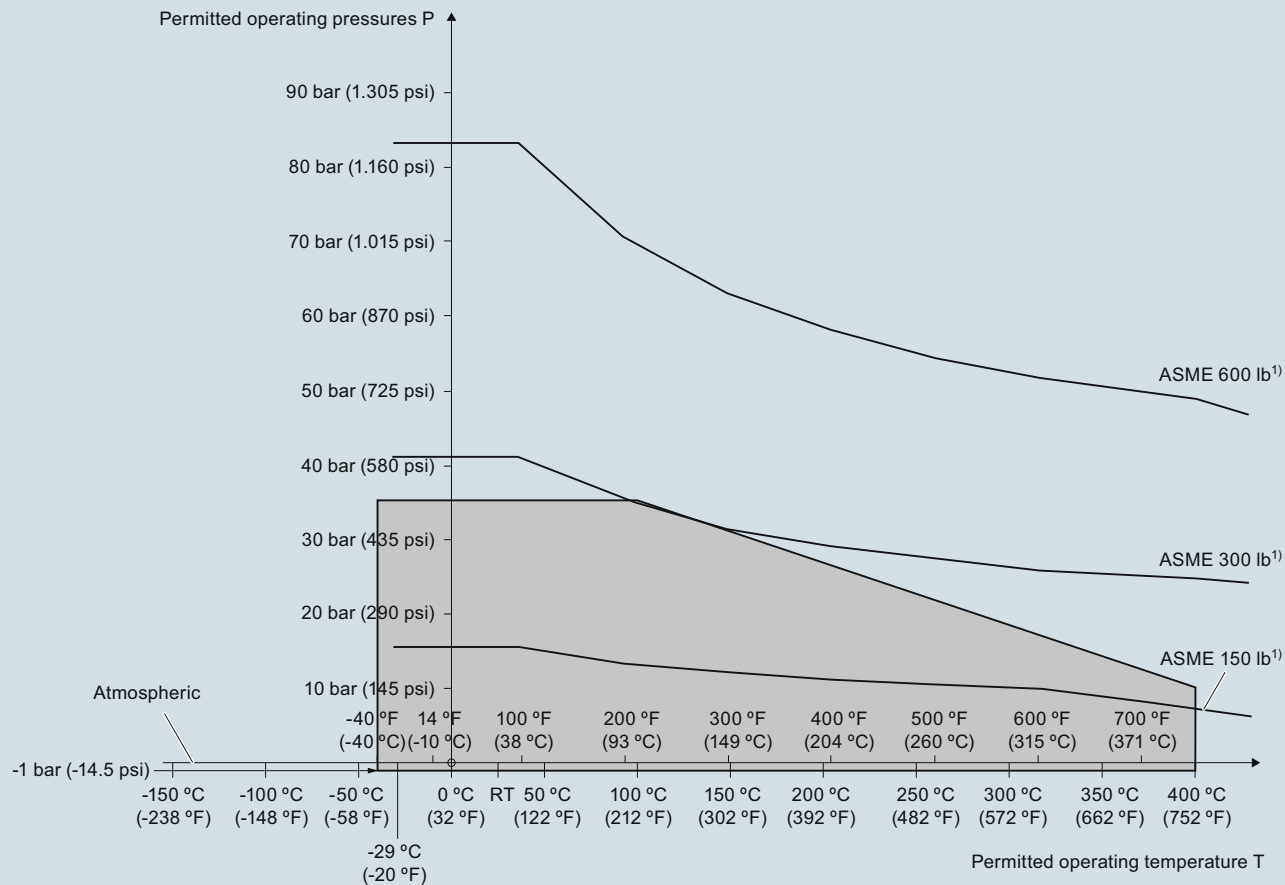
Pressure/temperature curve
CLS500 rod probes
EN flanged process connections
(7ML5602 and 7ML5603)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

Pointek CLS500 Process Pressure/Temperature derating curves (7ML5602 and 7ML5603)

Pressure/temperature curve
CLS500 high temperature (no insulation)
ASME flanged process connections
(7ML5604)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

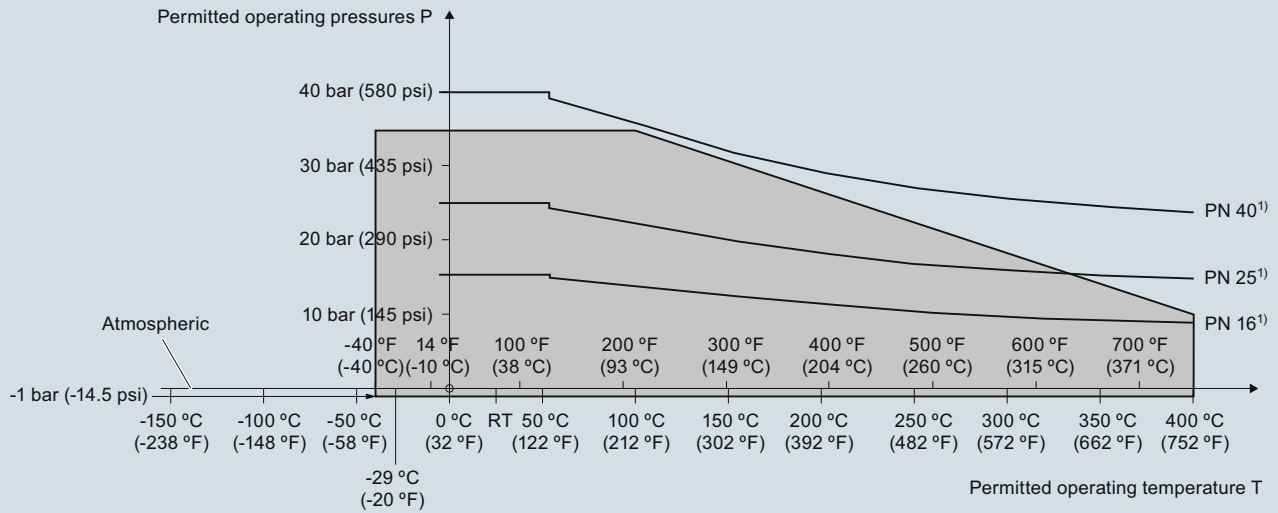
Pointek CLS500 Process Pressure/Temperature derating curves (7ML5604)

Level Measurement

Point level measurement – Capacitance switches

Pointek CLS500

Pressure/temperature curve
CLS500 high temperature (no insulation)
EN flanged process connections
(7ML5604)

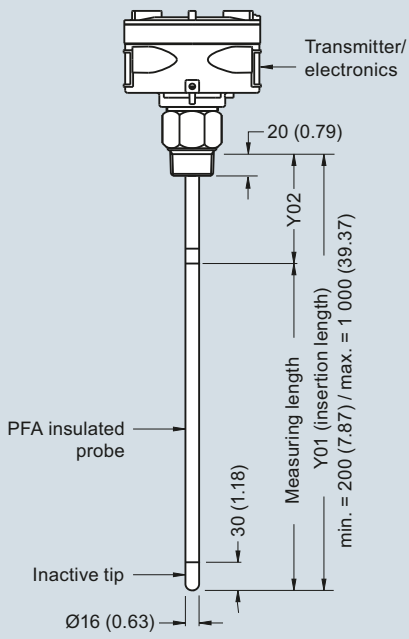


¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

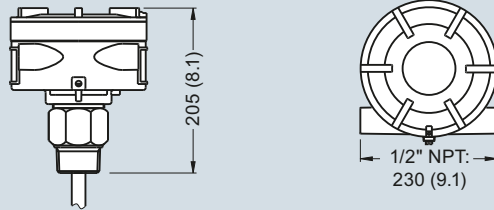
Pointek CLS500 Process Pressure/Temperature derating curves (7ML5604)

Dimensional drawings

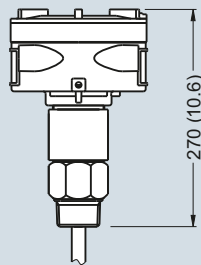
**Standard rod version
Threaded (7ML5601)**



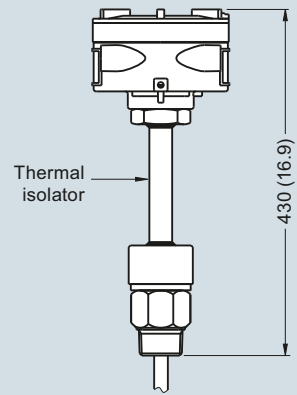
**Standard configuration
(7ML5601)**



**With explosion-proof seal option
(all versions)**



**With thermal isolator option
(all versions)**



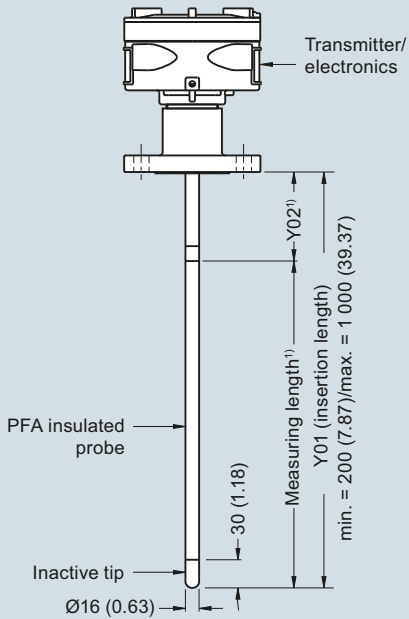
Pointek CLS500 - Threaded Process Connections, dimensions in mm (inch)

Level Measurement

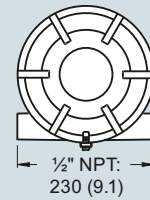
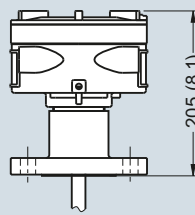
Point level measurement – Capacitance switches

Pointek CLS500

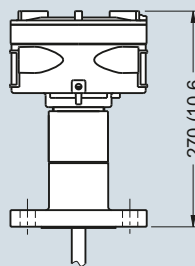
Standard Rod version
Welded Flange (7ML5602)
Single Piece Flange (7ML5603)



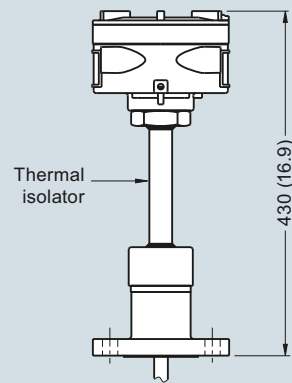
Standard configuration
(7ML5602, 7ML5603)



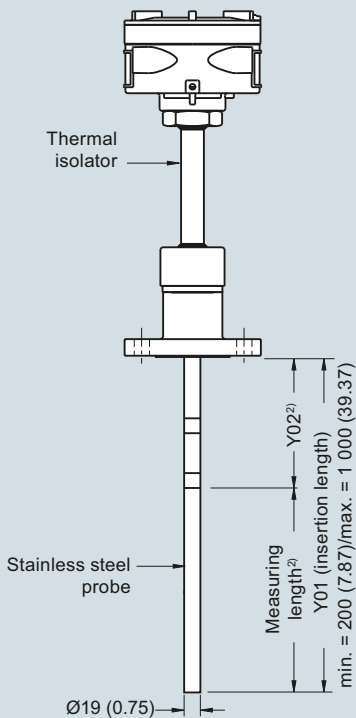
With explosion-proof seal option
(all versions)



With thermal isolator option
(all versions)



High temperature rod version
Welded Flange (7ML5604), Stainless steel rod⁴)



Flange Facing (raised face)	
Flange Class	Facing thickness
△ ASME 150/300	2 (0.08)
△ ASME 600/900	7 (0.28)
△ PN16/25/40/64	2 (0.08)

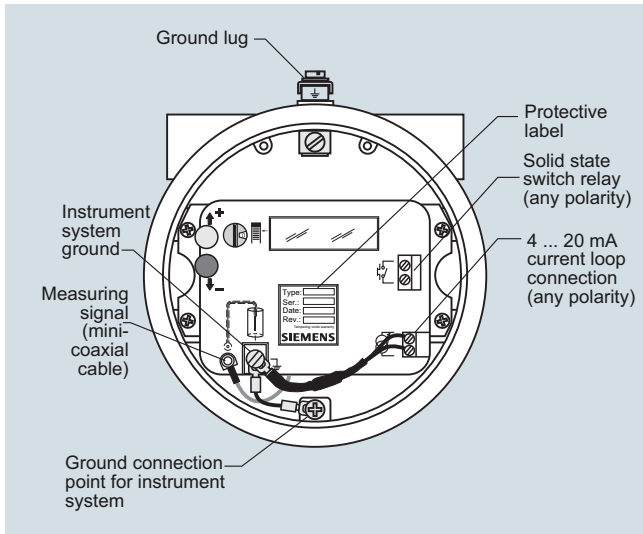
Notes:

- ¹) Min. Y02 (active shield length) = 50 (1.96)
- ²) Min. Y02 (active shield length) = 105 (4.13)
- ³) Min. Y02 (active shield length) = 100 (3.94)
- ⁴) Non conductive materials only

Insertion length does not include any raised face/gasket face dimension (see Flange Facing Table above)

Pointek CLS500 - Flanged Process Connections, dimensions in mm (inch)

Schematics



Pointek CLS500 connections

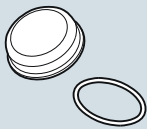
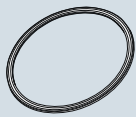
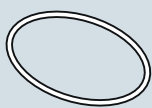
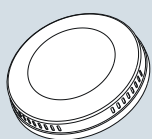
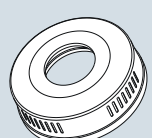

Level Measurement

Point level measurement – Capacitance switches

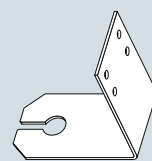


Pointek CLS Specials



Selection and ordering data


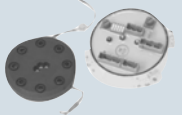

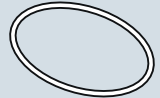
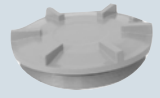
Pointek Specials¹⁾

	Article No.
CLS100 Polycarbonate Lid and Gasket, FKM 	A5E01163671
Kit, Lid and gasket, CLS100 enclosure version	
CLS100 Miscellaneous Parts Custom length of cable is available only for 7ML5501-xxx1x and 7ML5501-xxx5x ²⁾	
CLS200 Gasket (IP65), Synprene 	A5E01163672
Spare gasket, enclosure version (IP65 versions only)	
CLS200 Gasket (IP68), Silicone 	A5E01163673
Spare gasket, enclosure version (IP68 versions)	
CLS200 Blind Lid 	A5E01163674
Spare aluminum blind lid (for standard versions only)	
CLS200 Lid with window 	A5E01163676
Spare aluminum lid with window	
CLS200 Sensor Kit for cable units 	A5E01163677
Kit, Sensor for cable units, PPS, Standard, FKM	

Pointek Specials¹⁾

	Article No.
Kit, Sensor for cable units, PPS, Digital, FKM	A5E01163678
Kit, Sensor for cable units, PPS, Standard, FFKM	A5E01163679
Kit, Sensor for cable units, PPS, Digital, FFKM	A5E01163680
Kit, Sensor for cable units, PVDF, Standard, FKM	A5E01163681
Kit, Sensor for cable units, PVDF, Digital, FKM	A5E01163682
Kit, Sensor for cable units, PVDF, Standard, FFKM	A5E01163683
Kit, Sensor for cable units, PVDF, Digital, FFKM	A5E01163684
CLS200 Mounting Bracket, 316L stainless steel 	
Spare mounting bracket	A5E01163685
CLS200 PROFIBUS Connector (IP65) 	
Spare, PROFIBUS connector (IP65 versions only)	A5E01163686
CLS200 Miscellaneous Parts CLS200 with FFKM O-rings (any version) ²⁾	
CLS200 Electronics Test magnet, digital version	7ML1830-1JE
Amplifier/power supply kit, standard version	A5E03251681
Amplifier/power supply, digital version	7ML1830-1JF
LCD display, digital version	7ML1830-1JK
CLS300 Cable Extensions, 316L stainless steel 	
Kit, stainless steel cable extension, 1 m, adjustable by customer	A5E01163688
Kit, stainless steel cable extension, 3 m, adjustable by customer	A5E01163689
Kit, stainless steel cable extension, 5 m, adjustable by customer	A5E01163690
Kit, stainless steel cable extension, 10 m, adjustable by customer	A5E01163691
Kit, stainless steel cable extension, 15 m, adjustable by customer	A5E01163693
Kit, stainless steel cable extension, 20 m, adjustable by customer	A5E01163695

Pointek Specials ¹⁾	
	Article No.
CLS300 Cable Extensions, 316 stainless steel with PFA coating	
Kit, PFA cable extension, 1 m, adjustable by customer	A5E01163697
Kit, PFA cable extension, 3 m, adjustable by customer	A5E01163698
Kit, PFA cable extension, 5 m, adjustable by customer	A5E01163699
Kit, PFA cable extension, 10 m, adjustable by customer	A5E01163700
Kit, PFA cable extension, 15 m, adjustable by customer	A5E01163701
Kit, PFA cable extension, 20 m, adjustable by customer	A5E01163702
CLS300 Rod Kits, 316L stainless steel	
Kit, stainless steel rod 180 mm (7.09 inch) to be used with CLS300 units only (with standard active shield). Insertion length after installation is 350 mm (13.78 inch).	A5E01163719
Kit, stainless steel rod 330 mm (12.99 inch) to be used with CLS300 units only (with standard active shield). Insertion length after installation is 500 mm (19.69 inch).	A5E01163720
Kit, stainless steel rod 580 mm (22.83 inch) to be used with CLS300 units only (with standard active shield). Insertion length after installation is 750 mm (29.53 inch).	A5E01163721
Kit, stainless steel rod 830 mm (32.68 inch) to be used with CLS300 units only (with standard active shield). Insertion length after installation is 1 000 mm (39.37 inch).	A5E01163722
Kit, stainless steel rod 1 330 mm (52.36 inch) to be used with CLS300 units only (with standard active shield). Insertion length after installation is 1 500 mm (59.06 inch). ²⁾	
Kit, stainless steel rod 1 830 mm (72.05 inch) to be used with CLS300 units only (with standard active shield). Insertion length after installation is 2 000 mm (78.74 inch). ²⁾	
Kit, stainless steel rod customized length up to 1 m ²⁾	
Kit, stainless steel rod customized length up to 2 m ²⁾	

Pointek Specials ¹⁾	
	Article No.
CLS300 Electronics Kits with drivers (for rod or cable versions)	
Kit, Electronics with driver, standard CLS300. To be used in rod or cable versions with length less than 5 m. ³⁾⁴⁾	A5E01163723
Kit, Electronics with driver, digital CLS300. To be used in rod or cable versions with length less than 5 m. ³⁾⁴⁾	A5E01163725
CLS300 Electronics Kits with drivers (for cable versions)	
Kit, Electronics with driver, standard CLS300. To be used in cable versions with length greater than 5 m. ³⁾⁴⁾	A5E01163724
Kit, Electronics with driver, digital CLS300. To be used in cable versions with length greater than 5 m. ³⁾⁴⁾	A5E01163726
CLS300 Electronics	
Test magnet, digital version	7ML1830-1JE
Amplifier/power supply kit, standard version	A5E03251683
Amplifier/power supply, digital version	7ML1830-1JF
LCD display, digital version	7ML1830-1JK
CLS300 Weight Kit, 316L stainless steel	
Kit, Spare stainless steel weight. To be used in any cable version of CLS300	A5E01163727
CLS500 Gasket (IP65), Silicone	
Spare gasket, CLS500 enclosure version, IP65	A5E01163728
CLS500 Blind Lid	
Spare CLS500 aluminum blind lid	A5E01163729
CLS500 Electronics Kit	
Transmitter, MSP 2002-1, 330 PF	7ML1830-1JP

¹⁾ Special flange sizes and facings are available. Please contact ceg.smpi@siemens.com for part number and pricing. Submit Application Questionnaire found on page 4/11.

²⁾ Please contact ceg.smpi@siemens.com for part number and pricing.

³⁾ For General Purpose approvals only.

⁴⁾ To maintain approvals, qualified trained Siemens personnel required for part replacement.

Please contact ceg.smpi@siemens.com for special requests.

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL100

Overview



SITRANS LVL100 is a compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low and demand applications, as well as pump protection. It is ideal for use in confined spaces.

Benefits

- Proven vibrating level switch technology for liquids
- Compact insertion length of 40 mm (1.57 inch) for confined space applications
- Fault monitoring for corrosion, loss of vibration, or line break to the piezo drive
- Integrated test function to confirm correct operation

Application

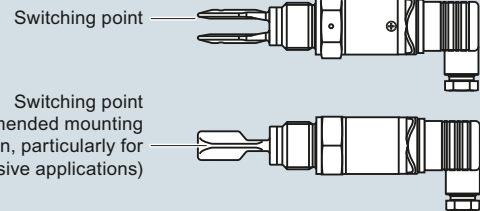
SITRANS LVL100 is a compact level switch designed for industrial use in all areas of process technology and can be used for material detection with liquids and slurries. With an insertion length of only 40 mm (1.57 inch), SITRANS LVL100 can be mounted in small pipes and confined space applications. It is virtually unaffected by the chemical and physical properties of the liquid. The LVL100 can be used in difficult conditions including turbulence, air bubbles, foam generation, buildup, or external vibration.

The tuning fork is piezoelectrically energized and vibrates at a mechanical resonance frequency of approximately 1 200 Hz. The vibration frequency changes when the tuning fork is covered by the medium. This change is detected by the integrated oscillator and converted into a switching command. The integrated electronics evaluate the level signal and output a switching signal to connected devices.

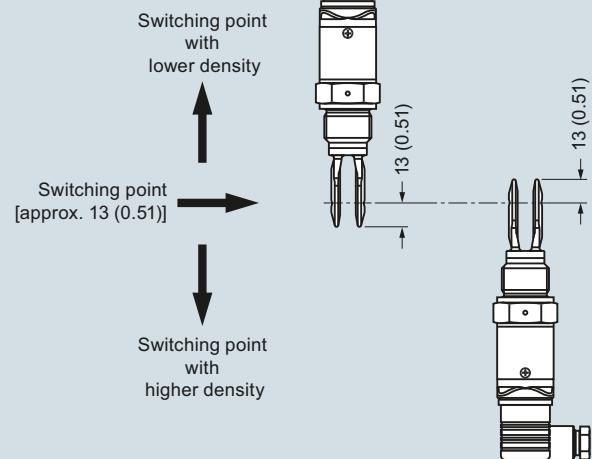
- Key Applications: For use in liquids and slurries, for level measurement, overflow, and dry run protection

Configuration

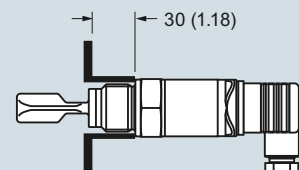
Horizontal mounting



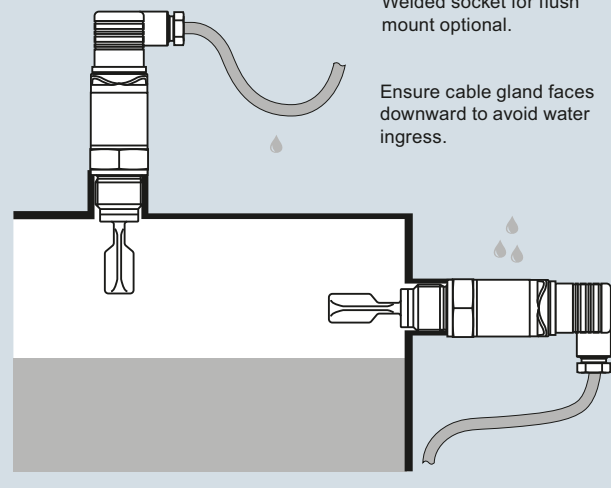
Vertical mounting



Horizontal mounting in viscous or adhesive applications



Moisture protection

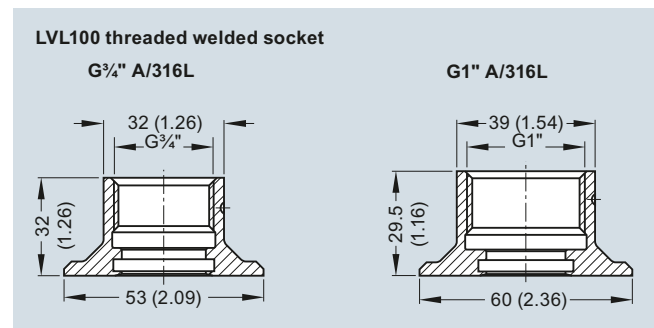


SITRANS LVL100 Installation, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	Vibrating point level switch
Input	
Measured variable	High and low and demand
Output	
Output options	Contactless electronic switch Transistor output PNP
Measuring Accuracy	
• Hysteresis	Approx. 2 mm (0.08 inch) with vertical installation
• Switching delay	Approx. 500 ms (on/off)
• Frequency	Approx. 1 200 Hz
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)
• Installation category	III
• Pollution degree	2
Medium conditions	
• Temperature	
- Standard	-40 ... +100 °C (-40 ... +212 °F)
- High temperature option	-40 ... +150 °C (-40 ... +302 °F)
• Pressure (vessel)	-1 ... 64 bar g (-14.5 ... 928 psi g)
• Density	0.7 ... 2.5 g/cm ³ (0.025 ... 0.09 lb/in ³)
Design	
Material	
• Enclosure	316L and Plastic PEI
• Tuning fork	316L (1.4404 or 1.4435)
• Process connection (threaded)	316L (1.4404 or 1.4435)
• Process seal	Klingersil C-4400
Process connection	
• Pipe thread, cylindrical (ISO 228 T1)	G ½" A, G ¾" A or G 1" A
• Pipe thread, tapered	½" NPT, ¾" NPT or 1" NPT
• Hygienic fittings	Bolting DN 40 PN 40 Tri-clamp 1", 1½", 2" PN 10
Degree of protection	
	IP65/Type 4/NEMA 4 (with DIN 43650 valve plug), IP66/67 or IP68 (with M12 connector)
Conduit entry	
Weight (housing)	1 x M12 [IP66/IP67 or IP68 (0.2 bar)] 250 g (9 oz)
Power supply	
Supply voltage	20 ... 253 V AC, 50/60 Hz 20 ... 253 V DC
Power consumption	Max. 0.5 W
Certificates and approvals	
	• Overfill protection (WHG) • Shipping approvals

Options



SITRANS LVL100 welded socket, dimensions in mm (inch)

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL100

Selection and Ordering data	Article No.
SITRANS LVL100 Compact vibrating level switch for use in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. Ideal for use in confined spaces. Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5745- A 0
Approvals Without approvals Shipping approvals ⁵⁾ Overfill protection (WHG) ¹⁾	1 2 3
Process temperature Standard -40 ... +100 °C (-40 ... +212 °F) ²⁾ Extended -40 ... +150 °C (-40 ... +302 °F) ²⁾ Hygienic applications -40 ... +150 °C (-40 ... +302 °F) ³⁾	A B C
Process connection Thread G $\frac{3}{4}$ " A PN 64/316L Thread G $\frac{3}{4}$ " A PN 64/316L Ra < 0.8 µm Thread $\frac{3}{4}$ " NPT PN 64/316L Thread $\frac{3}{4}$ " NPT PN 64/316L Ra < 0.8 µm Thread G1" A PN 64/316L Thread G1" A PN 64/316L Ra < 0.8 µm Thread 1" NPT PN 64/316L Thread 1" NPT PN 64/316L Ra < 0.8 µm Tri-Clamp 1" PN 16 DIN 32676/316L Ra < 0.8 µm Tri-Clamp 1½" PN 16 DIN 32676/316L Ra < 0.8 µm Tri-Clamp 2" PN 16 DIN 32676/316L Ra < 0.8 µm Bolting DN25 PN 40 DIN 11851/316L Ra < 0.8 µm Bolting DN40 PN 40 DIN 11851/316L Ra < 0.8 µm Bolting DN50 PN 25 DIN 11851/316L Ra < 0.8 µm SMS DN38 PN 6 316L Ra < 0.8 µm Hygienic fitting with compression nut F40 PN 25/316L Ra < 0.8 µm Thread G½" (DIN 3852-A) PN64 / 316L Thread G½" (DIN 3852-A) PN64 / 316L Ra < 0.8 µm Thread ½" NPT (ASME B1.20.1) PN 64/316L Thread ½" NPT (ASME B1.20.1) PN 64/316L Ra < 0.8 µm	A 0 A 1 A 2 A 3 A 4 A 5 A 6 A 7 A 8 B 0 B 1 B 2 B 3 B 4 B 5 B 6 C 0 C 1 C 2 C 3
Electronics Contactless electronic switch 20 ... 250 V AC/DC ⁴⁾ Transistor output PNP 10 ... 55 V DC	1 2
Housing 316L	1
Electrical connection/Protection M12x1/IP67 According to DIN 43650 including plug/IP65 Acc. to DIN 43650 incl. plug with QuickOn connection/IP65 M12x1 incl. 5 m cable/IP68 (0.2 bar)	A B C D

1) Available with process connection A0, A2, A4, and A6 only

2) Available with process connection A1, A3, A5, and A7 ... B6 only

3) Available with Electrical connection/Protection option B and C only

4) Available with Process Temperature option A only

5) Available with Process Temperature option A only

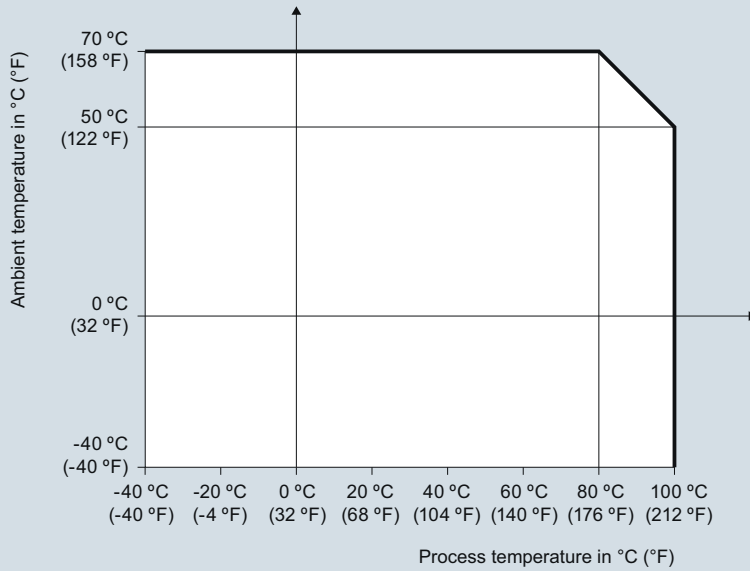
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Cleaning including certificate (oil, grease and silicone free)	W01
Identification Label, foil laser marking	◆ Y16
Acceptance test certificate 3.1 for instrument	◆ C12
Acceptance test Certificate 2.2 for material EN10204	◆ C15
Additional Operating Instructions <u>LVL100 (Contactless electronic switch)</u>	Article No.
• English	7ML1998-5KN01
• French	7ML1998-5KN11
• Spanish	7ML1998-5KN21
• German	7ML1998-5KN31
<u>LVL100 (Transistor PNP)</u>	
• English	7ML1998-5KP01
• French	7ML1998-5KP11
• Spanish	7ML1998-5KP21
• German	7ML1998-5KP31
This device is shipped with the Siemens Milltronics manual DVD containing the Operating Instructions library.	
Spare Parts <u>LVL100 Threaded Welded Socket</u>	
G $\frac{3}{4}$ " A/316L with FKM Seal	7ML1930-1EE
G1" A/316L with FKM Seal	7ML1930-1EF
M27x1.5/316L with FKM Seal	7ML1930-1EG
G $\frac{3}{4}$ " A/316L with EPDM Seal	7ML1930-1EH
G1" A/316L with EPDM Seal	7ML1930-1EJ
M27x1.5/316L with EPDM Seal	7ML1930-1EK

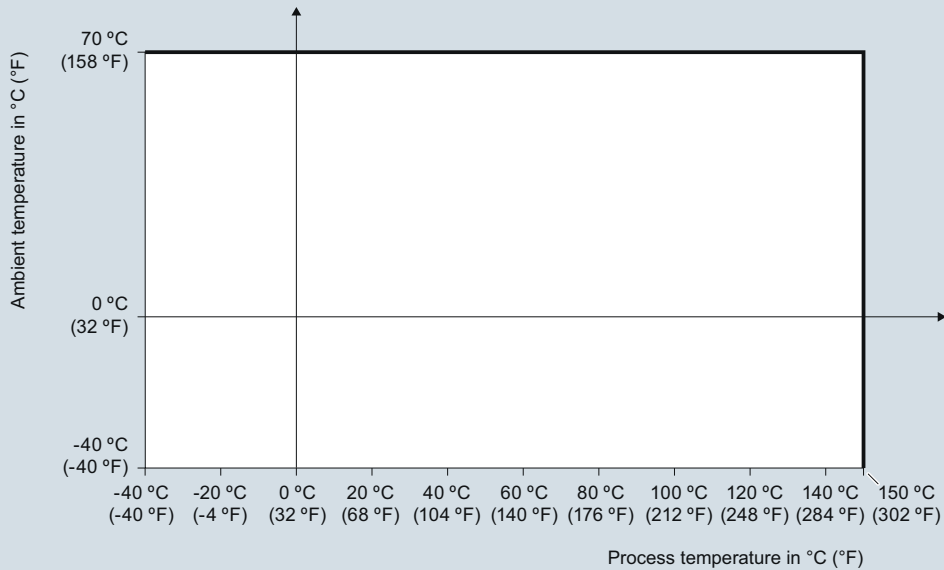
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Characteristic curves

Ambient temperature to process temperature dependency
(standard version)



Ambient temperature to process temperature dependency
(high temperature version)



SITRANS LVL100 Ambient Temperature/Process Temperature derating curves

Level Measurement

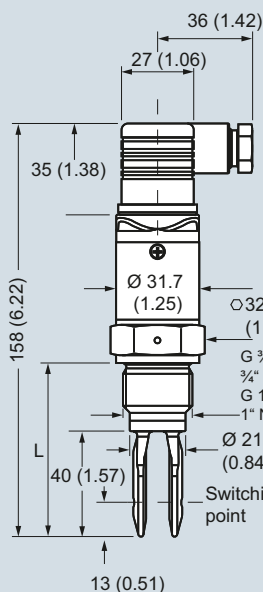
Point level measurement – Vibrating switches

SITRANS LVL100

Dimensional drawings

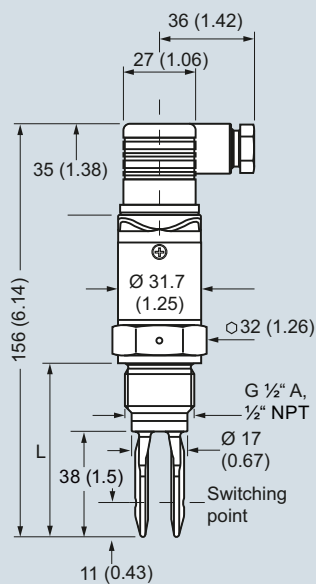
SITRANS LVL100 (standard)

Thread G 3/4" A, G 1" A
(DIN ISO 228/1),
3/4" NPT or 1" NPT
(valve plug ISO 4400)



L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)

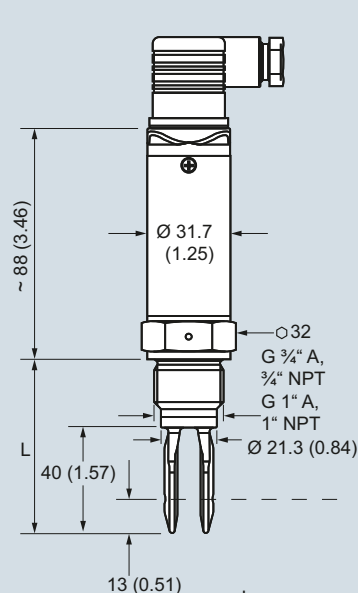
Thread G 1/2" A
(DIN ISO 228/1),
1/2" NPT
(valve plug ISO 4400)



L =
Length with G 1/2" A, 1/2" NPT: 62 (2.4)

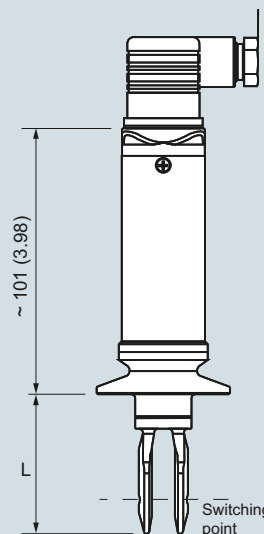
SITRANS LVL100 (extended high temperature)

Thread G 3/4" A, G 1" A
(DIN ISO 228/1),
3/4" NPT or 1" NPT
(valve plug DIN 43650)

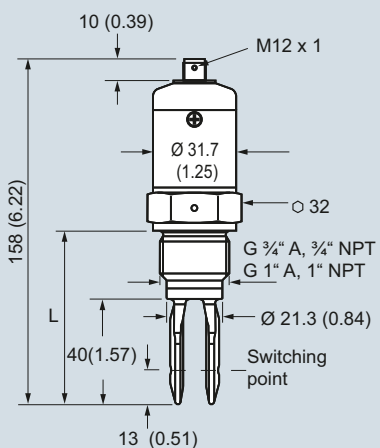


L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)
Length with Tri-clamp: 53 (2.1)

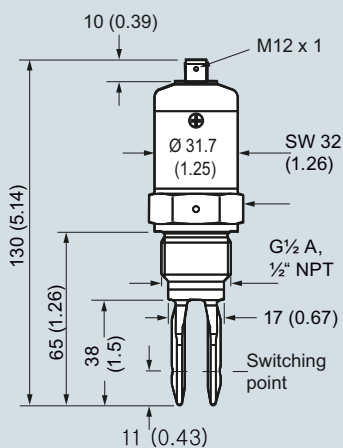
Tri-clamp (valve plug DIN 43650)



SITRANS LVL100 (standard with M12 connector)



L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)

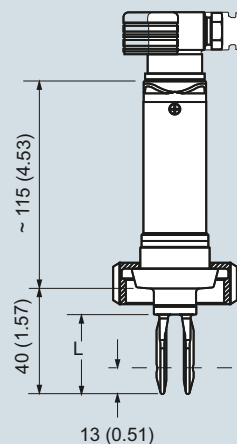


L =
Length with G 1/2" A, 1/2" NPT: 62 (2.4)

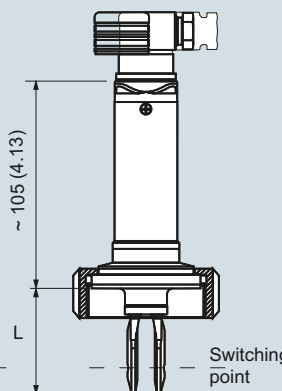
SITRANS LVL100 (extended, high temperature)

Bolting DIN 11851
(valve plug DIN 43650)

SMS 1145
(valve plug DIN 43650)



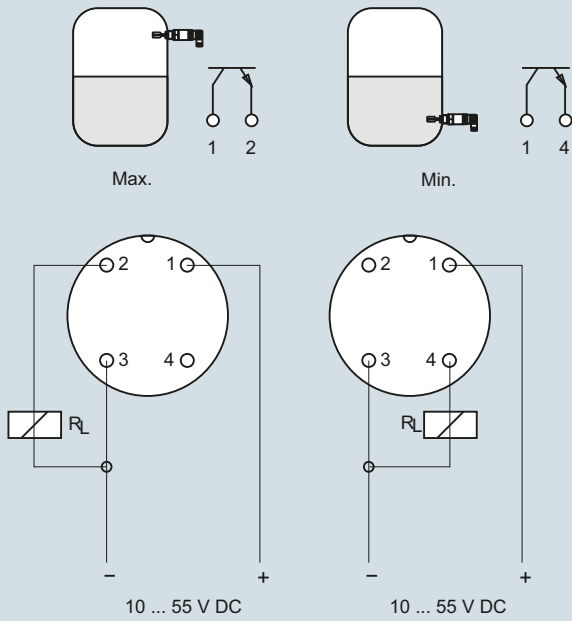
L =
Length with bolting: 53 (2.1)
Length with SMS 1145: 53 (2)



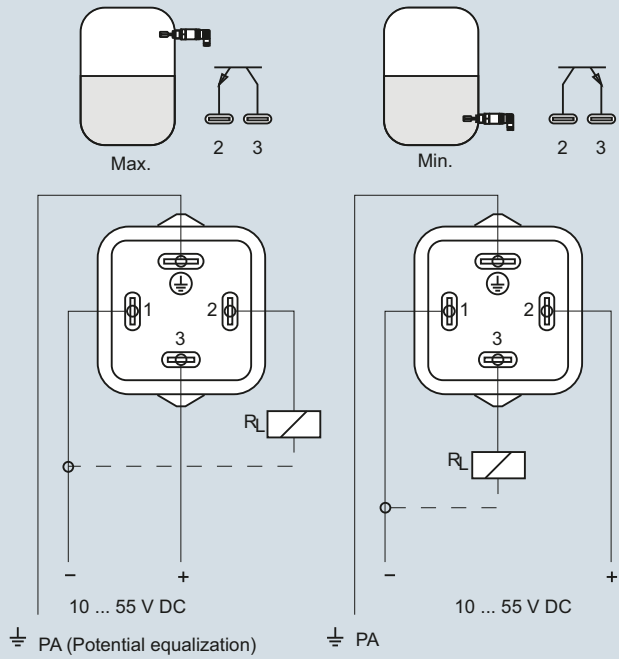
SITRANS LVL100, dimensions in mm (inch)

Schematics

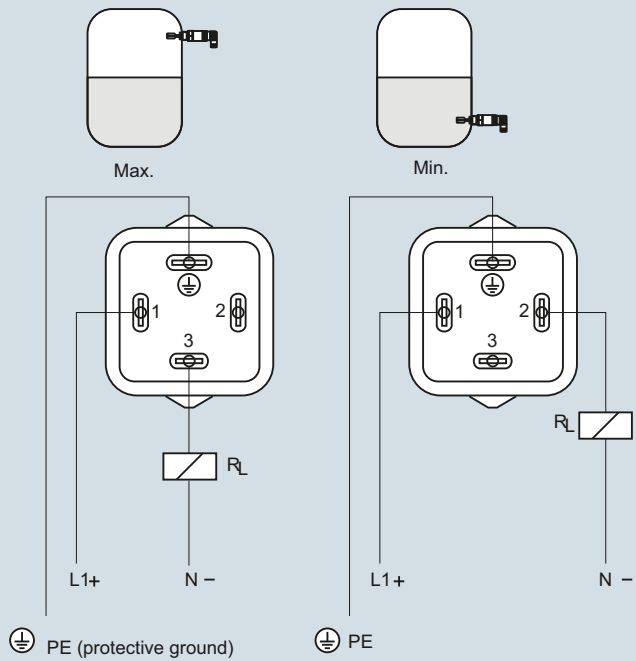
Transistor PNP (M12 x 1 plug connection)



Transistor PNP (with valve plug DIN 43650)



Contactless electronic switch (valve plug DIN 43650)



SITRANS LVL100, connections

4

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Overview



SITRANS LVL200 is a standard vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 applications.

Benefits

- Proven vibrating level switch technology for liquids
- Compact insertion length of 40 mm (1.57 inch) for confined space applications
- Fault monitoring for corrosion, loss of vibration or line break to the piezo drive
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511
- Hygienic process connections

Application

SITRANS LVL200 is a level switch designed for industrial use in all areas of process technology and can be used with liquids and slurries. With a tuning fork insertion length of only 40 mm (1.57 inch), SITRANS LVL200 can be mounted in small pipes and applications with confined space. The LVL200 can be used to measure products with a minimum density of $> 0.5 \text{ g/cm}^3$ (0.018 lb/in^3). The LVL200 can be used in difficult conditions including turbulence, air bubbles, foam generation, buildup, or external vibration.

SITRANS LVL200 continuously monitors faults via frequency evaluation, providing early detection of strong corrosion or damage on the tuning fork, loss of vibration, or a line break to the piezo drive.

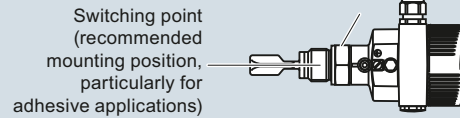
The tuning fork is piezoelectrically energized and vibrates at its mechanical resonance frequency of approximately 1 200 Hz. The vibration frequency changes when the tuning fork is covered by the medium. This change is detected by the integrated oscillator and converted into a switching command. The integrated electronics evaluate the level signal and output a switching signal, directly operating connected devices.

- Key Applications: For use in liquids and slurries, for level measurement, overflow, and dry run protection

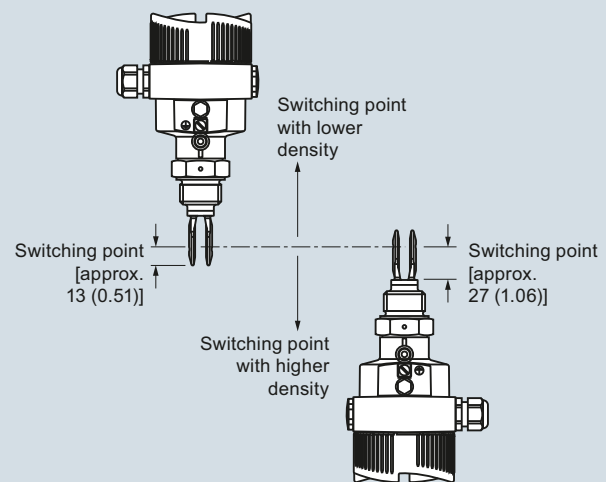
Configuration

Horizontal mounting

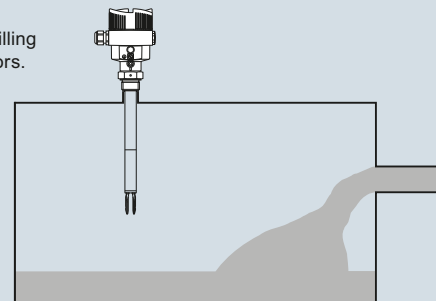
Marked with screwed version on top, with flange versions directed to the flange holes



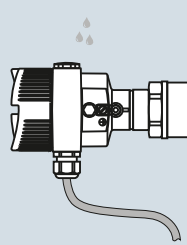
Vertical mounting



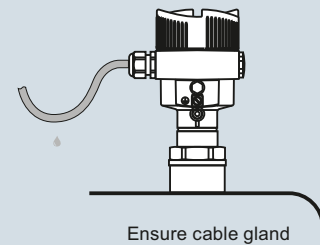
Mount away from filling openings or agitators.



Moisture protection



NOTE:
Welded socket for flush mount optional



Ensure cable gland faces downward to avoid water ingress.

SITRANS LVL200 installation, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	Vibrating point level switch
Input	
Measured variable	High and low and demand (via mode switch)
Output	
Output options	<ul style="list-style-type: none"> Relay output (DPDT), 2 floating SPDTs Contactless electronic switch 2 wire Namur signal output
Measuring Accuracy	
Repeatability	0.1 mm (0.004 inch)
Hysteresis	Approx. 2 mm (0.08 inch) with vertical installation
Switching delay	Approx. 500 ms (on/off)
Frequency	Approx. 1 200 Hz
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)
• Installation category	III
• Pollution degree	2
Medium conditions	
• Temperature	
- LVL200S Standard	-50 ... +150 °C (-58 ... +302 °F)
- LVL200S High temperature option	-50 ... +250 °C (-58 ... +482 °F)
- LVL200E Standard: with 316L/Hastelloy	-50 ... +150 °C (-58 ... +302 °F)
- LVL200E High temperature option: with 316L/Hastelloy	-50 ... +250 °C (-58 ... +482 °F)
• Pressure (vessel)	-1 ... 64 bar g (-14.5 ... 928 psi g)
• Density	0.7 ... 2.5 g/cm ³ (0.025 ... 0.09 lb/in ³); 0.5 ... 2.5 g/cm ³ (0.018 ... 0.09 lb/in ³) by switching over
Design	
Material	
• Enclosure	Aluminum die-cast AlSi10Mg, powder-coated, basis: Polyester Stainless steel housing, electro-polished 316L
• Tuning fork	316L (1.4404 or 1.4435), Hastelloy
• Extension tube [ø 21.3 mm (0.839 inch)]	316L (1.4404 or 1.4435), Hastelloy
• Process connection: threaded	316L (1.4404 or 1.4435), Hastelloy
• Process connection: flange	316L (1.4404 or 1.4435), 316L with Hastelloy, ECTFE, or PFA coating Klingersil C-4400
• Process seal	
Process connection	
• Pipe thread, cylindrical (ISO 228 T1)	G ¾" A, G 1" A
• Pipe thread, tapered	¾" NPT, 1" NPT, 1½" NPT
• Flanges	DIN from DN25, ANSI from 1"
• Hygienic fittings	Bolting DN 40 PN 40, 1, 1½, 2, 2½" Tri-Clamp PN 10, conus DN 25 PN 40, Tuchenhagen Varivent DN 50 PN 10, SMS

Degree of protection	Type 4X/NEMA 4X/IP66/IP67
Conduit entry	<ul style="list-style-type: none"> 1 x M20x1.5 (cable: ø5 ... 9 mm), 1 x blind stopper M20x1.5; attached 1 x M20x1.5 cable entry 1 x ½" NPT cable entry, 1 x blind stopper ½" NPT, 1 x ½" NPT cable entry 1 x M12x1; 1 x blind stopper M20x1.5
Weight	
• Device weight (dependent on process fitting)	Approx. 0.8 ... 4 kg (0.18 ... 8.82 lb)
• Tube extension (extended version)	Approx 920 g/m (10 oz/ft)
Power supply	
Supply voltage	
• Relay DPDT	20 ... 253 V AC, 50/60 Hz, 20 ... 72 V DC [at U>60 V DC]
• Contactless	20 ... 253 V AC, 50/60 Hz, 20 ... 253 V DC
• 2 wire NAMUR	
Operating voltage (characteristics according to standard) for connection to an amplifier according to NAMUR	IEC 60947-5-6, approx. 8.2 V Off-load voltage U ₀ approx. 8.2 V Short-circuit current I _U approx. 8.2 mA
Power consumption	1 ... 8 VA (AC), approx. 1.3 W (DC)
• Relay DPDT	1 ... 8 VA (AC), approx. 1.3 W (DC)
• Contactless	Domestic current requirement approx. 3 mA (via load circuit)
	Load current
	- Min. 10 mA
	- Max. 400 mA [with I > 300 mA the ambient temperature can be max. 60 °C (140 °F)]
	- Max. 4 A up to 40 ms (not WHG specified)
• 2 wire Namur	Current consumption
	- Falling characteristics ≥ 2.6 mA uncovered/≤ 0.6 mA covered
	- ≤ 0.6 mA uncovered/≥ 2.6 mA covered
	- Failure message ≤ 0.6 mA
Certificates and approvals	
	<ul style="list-style-type: none"> CE, CSA Overfill Protection WHG and VLAREM II FM (Non-Incendive) Class I, Div. 2, Groups A, B, C, D FM (Explosion-Proof) Class I, Div. 1, Groups A, B, C, D; (Dust Ignition-Proof) Class II, III, Div. 1, Groups E, F, G1) IECEX d IIC T6...T2 Ga/Gb EHEDG ATEX II 1/2G, 2G EEx d IIC T6 ATEX II 1G, 1/2G, 2G EEx ia IIC T6
	Shipping approvals
	• BR-Ex d IIC T6...T2
	• FDA, 3A, Ehedge
	• SIL/IEC61508 Declaration of Conformity [SIL-2 (min/max detection)]

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data

Article No.

SITRANS LVL200, Standard

Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.

➔ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Electronics

Contactless electronic switch 20...250 V AC/DC ● 1
 Double relay (DPDT) 20 ... 72 V DC/20 ... 250 V AC ● 2
 NAMUR signal¹⁾ ● 4

Approvals

Without approvals ● A
 Overfill protection (WHG) ● B
 ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG²⁾ ● C
 ATEX II 1/2G, 2G EEx d IIC T6 + WHG³⁾ ● D
 ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + shipping approvals²⁾ ● E
 ATEX II 1/2G, 2G EEx d IIC T6 + shipping approvals³⁾ ● F
 ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + ATEX II 1/2 D IP6X T²⁾ ● G
 IECEx Ex ia IIC T6²⁾ ● H
 Shipping approvals ● K
 FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G^{2/4)} ● N
 FM (XP) Class I, Div. 1, Groups A, B, C, D; (DIP) Class II, III, Div. 1, Groups E, F, G^{3/4)} ● P
 FM (NI) Class I, Div. 2, Groups A, B, C, D⁴⁾ ● Q
 IECEx d IIC T6...T2 Ga/Gb ● R
 CSA(XP)CL I, II, III Div. 1, Groups A, B, C, D, E, F, G ● S
 CSA(NI)CL I, II, III, Div. 2, Groups A, B, C, D, E, F, G ● T
 BR-Ex d IIC T6...T2 ● U
 CSA(IS)CL I, II, III Div. 1, Groups A, B, C, D, E, F, G ● V

Process connection

Thread G^{3/4}" A, PN 64/316L ● A 0 0
 Thread G^{3/4}" A, PN 64/316L Ra < 0.8 μm ● A 0 1
 Thread ^{3/4}" NPT, PN 64/316L ● A 0 2
 Thread ^{3/4}" NPT, PN 64/316L Ra < 0.8 μm ● A 0 3
 Thread ^{3/4}" NPT, PN 64/Monel ● A 0 4
 Thread G^{3/4}" A, PN 64/Hastelloy ● A 0 5
 Thread ^{3/4}" NPT, PN 64/Hastelloy ● A 0 6
 Thread G1" A, PN 64/316L ● A 0 7
 Thread G1" A, PN 64/316L ECTFE coated MB1982⁵⁾ ● A 0 8
 Thread G1" A, PN 64/316L PFA coated⁵⁾ ● A 1 0
 Thread G1" A, PN 64/Monel ● A 1 1
 Thread G1" A, PN 64 / 316L Ra<0.8μm ● A 1 2
 Thread G1" A, PN 64/316L Ra < 0.8 μm ● A 1 3
 Thread 1" NPT, PN 64/316L⁵⁾ ● A 1 4
 Thread 1" NPT, PN 64/316L ECTFE coated MB1982⁵⁾ ● A 1 5
 Thread 1" NPT, PN 64/316L PFA-coated ● A 1 6
 Thread 1" NPT, PN 64/Monel ● A 1 7
 Thread 1" NPT, PN 64/316L Ra < 0.8 μm ● A 1 8
 Thread G1" A, PN 64/Hastelloy ● A 2 0
 Thread G1^{1/2}" A, PN 64/316L ● A 2 1
 Thread G1^{1/2}" A, PN 64/316L Ra<0,8μm ● A 2 2
 Thread G1^{1/2}" A, PN 64/Hastelloy ● A 2 3
 Thread 1" NPT, PN 64/Hastelloy ● A 2 4
 Thread 1^{1/2}" NPT, PN 64/316L ● A 2 5
 Thread 1^{1/2}" NPT, PN 64/316L Ra<0,8μm ● A 2 6
 Thread 1^{1/2}" NPT, PN 64/Hastelloy ● A 2 7
 Thread G2" A, PN 64/316L ● A 2 8

Selection and Ordering data

Article No.

SITRANS LVL200, Standard



Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.

Thread M27x1.5, PN 64/316L ● A 3 0
 Conus DN 25, PN 40/316L Ra < 0.3 μm ● A 3 1
 Conus DN 25, PN 40/316L Ra < 0.8 μm ● A 3 2
 Conus DN 25, PN 40/ECTFE (ZB3033)⁵⁾ ● A 3 3
 Conus M52, PN 40/316L ● A 3 4
 Conus M52, PN 40/316L Ra < 0.3 μm ● A 3 5
 Conus M52, PN 40/316L Ra < 0.8 μm ● A 3 6
 Tri-Clamp 1", PN 16/316L Ra < 0.3 μm ● A 3 7
 Tri-Clamp 1", PN 16/Hastelloy ● A 3 8
 Tri-Clamp 1", PN 16/316L Ra < 0.8 μm ● A 4 0
 Tri-Clamp 1^{1/2}", PN 16/316L Ra < 0.3 μm ● A 4 1
 Tri-Clamp 1^{1/2}", PN 16/Hastelloy ● A 4 2
 Tri-Clamp 1^{1/2}", PN 16/316L Ra < 0.8 μm ● A 4 3
 Tri-Clamp 2", PN 16/316L Ra < 0.3 μm ● A 4 4
 Tri-Clamp 2", PN 16/Hastelloy ● A 4 5
 Tri-Clamp 2", PN 16/316L Ra < 0.8 μm ● A 4 6
 Tri-Clamp 2^{1/2}", PN 10/316L Ra < 0.3 μm ● A 4 7
 Tri-Clamp 2^{1/2}", PN 10/316L Ra < 0.8 μm ● A 4 8
 Tri-Clamp 3", PN 10/316L Ra < 0.3 μm ● A 5 0
 Tri-Clamp 3", PN 10/316L Ra < 0.8 μm ● A 5 1
 Bolting DN 32, PN 40 DIN11851/316L Ra < 0.3 μm ● A 5 2
 Bolting DN 32, PN 40 DIN11851/316L Ra < 0.8 μm ● A 5 3
 Bolting DN 25, PN 40 DIN11851/316L Ra < 0.3 μm ● A 5 4
 Bolting DN 25, PN 40 DIN11851/316L Ra < 0.8 μm ● A 5 5
 Bolting DN 40, PN 40 DIN11851/316L Ra < 0.3 μm ● A 5 6
 Bolting DN 40, PN 40 DIN11851/316L Ra < 0.8 μm ● A 5 7
 Bolting DN 40, PN 40 DIN11864-1 A/316L Ra < 0.8 μm ZB3052 ● A 5 8
 Bolting DN 50, PN 25 DIN11851/316L Ra < 0.3 μm ● A 6 0
 Bolting DN 50, PN 25 DIN11851/316L Ra < 0.8 μm ● A 6 1
 Bolting DN 50, PN 25 DIN11864-1 A/316L Ra < 0.8 μm ZB3052 ● A 6 2
 Hygienic w. compr. nut F40, PN 25/316L ● A 6 3
 Hygienic w. compr. nut F40, PN 25/316L Ra < 0.3 μm ● A 6 4
 Hygienic w. compr. nut F40, PN 25/316L Ra < 0.8 μm ● A 6 5
 Varivent N50-40/316L Ra < 0.3 μm ● A 6 6
 Varivent N50-40/316L Ra < 0.8 μm ● A 6 7
 Varivent N125/100/316L Ra < 0.8 μm ● A 6 8
 DRD flange, PN 40/316L ZB3007 ● A 7 0
 SMS DN 38/316L Ra < 0.8 μm⁵⁾ ● A 7 1
 SMS DN 51, PN 6/316L Ra < 0.8 μm⁵⁾ ● A 7 2
 Swagelok VCR screwing ZG2579, PN 64/316L ● A 7 3
 Neumo biocontrol size 25, PN 16/316L Ra < 0.8 μm ● A 7 4
 Neumo biocontrol size 50, PN 16/316L Ra < 0.8 μm⁵⁾ ● A 7 5
 Neumo biocontrol size 65, PN 16/316L Ra < 0.8 μm ● A 7 6
 Neumo biocontrol size 80, PN 16/316L Ra < 0.8 μm ● A 7 7
 SÜDMO DN 50, PN 10/316L Ra<0,8μm ● A 7 8
 Small flange DN 25, PN 1.5 DIN 28403/316L pol. Ra < 0.8 μm ● A 8 0
 Small flange DN 40, PN 1.5 DIN 28403/316L pol. Ra < 0.8 μm ● A 8 1
 Ingold connection, PN 16/316L Ra < 0.8 μm ● A 8 2
 Ingold connection, PN 16/Hastelloy ● A 8 3
 Terminal DN 33.7 PN 40 DIN11864-3-A-/316L BN2 Ra < 0.8 μm⁵⁾ ● A 8 4
 Hygienic fl. DN 50 PN 16 DIN11864-2-A-/316L Ra < 0.8 μm ● A 8 5

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LVL200, Standard	7ML5746-	SITRANS LVL200, Standard	7ML5746-
Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.		Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	
Flange DN 25, PN 6 Form C, DIN 2501/316L	A 86	Flange DN 80, PN 40 Form C, DIN 2501/PFA ⁵⁾	B 56
Flange DN 25, PN 6 Form C, DIN 2501/PFA ⁵⁾	A 87	Flange DN 80, PN 40 Form C, DIN 2501/Enamelled ⁶⁾	B 57
Flange DN 25, PN 40 Form C, DIN 2501/316L	A 88	Flange DN 80, PN 40 Form F, DIN 2501/316L	B 58
Flange DN 25, PN 40 Form C, DIN 2501/Hastelloy	B 00	Flange DN 80, PN 40 Form N, DIN 2501/316L	B 60
Flange DN 25, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 01	Flange DN 100, PN 16 Form C, DIN 2501/316L	B 62
Flange DN 25, PN 40 Form C, DIN 2501/PFA ⁵⁾	B 02	Flange DN 100, PN 16 Form C, DIN 2501/Hastelloy	B 63
Flange DN 25, PN 40 Form C, DIN 2501/Enamelled	B 03	Flange DN 100, PN 16 Form C, DIN 2501/ECTFE ⁵⁾	B 64
Flange DN 25, PN 40 Form D, DIN 2501/316L	B 04	Flange DN 100, PN 16 Form C, DIN 2501/PFA ⁵⁾	B 65
Flange DN 25, PN 40 Form F, DIN 2501/316L	B 05	Flange DN 100, PN 16 Form C, DIN 2501/Enamelled ⁶⁾	B 66
Flange DN 25, PN 40 Form N, DIN 2501/316L	B 06	Flange DN 100, PN 16 Form D, DIN 2501/316L	B 67
Flange DN 25, PN 40 Form N, DIN 2501/Hastelloy	B 07	Flange DN 100, PN 16 Form F, DIN 2501/316L	B 68
Flange DN 25, PN 40 Form N, DIN 2501/Monel solid	B 08	Flange DN 100, PN 16 Form N, DIN 2501/316L	B 70
Flange DN 25, PN 40 V13, DIN 2501/316L	B 10	Flange DN 100, PN 40 Form C, DIN 2501/316L	B 71
Flange DN 32, PN 40 Form C, DIN 2501/316L	B 11	Flange DN 100, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 72
Flange DN 32, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 12	Flange DN 100, PN 40 Form C, DIN 2501/PFA ⁵⁾	B 73
Flange DN 40, PN 6 Form C, DIN 2501/316L	B 13	Flange DN 100, PN 40 Form C, DIN 2501/Enamelled ⁶⁾	B 74
Flange DN 40, PN 6 Form C, DIN 2501/ECTFE ⁵⁾	B 14	Flange DN 100, PN 40 Form F, DIN 2501/316L	B 75
Flange DN 40, PN 40 Form C, DIN 2501/316L	B 15	Flange DN 100, PN 40 Form N, DIN 2501/316L	B 76
Flange DN 40, PN 40 Form C, DIN 2501/Hastelloy	B 16	Flange DN 100, PN 40 V13, DIN 2501/316L	B 77
Flange DN 40, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 17	Flange DN 100, PN 64 Form E, DIN 2501/316L	B 78
Flange DN 40, PN 40 Form C, DIN 2501/PFA ⁵⁾	B 18	Flange DN 100, PN 100 Form E, DIN 2501/316L	B 80
Flange DN 40, PN 40 Form C, DIN 2501/Enamelled ⁶⁾	B 20	Flange DN 100, PN 100 Form L, DIN 2501/316L	B 81
Flange DN 40, PN 40 Form F, DIN 2501/316L	B 21	Flange DN 125, PN 16 Form F, DIN 2501/316L	B 82
Flange DN 40, PN 40 Form N, DIN 2501/316L	B 22	Flange DN 125, PN 40 Form C, DIN 2501/316L	B 83
Flange DN 40, PN 40 Form E, DIN 2501/316L	B 23	Flange DN 125, PN 40 Form N, DIN 2512/ 316L	B 84
Flange DN 40, PN 40 V13, DIN 2501/316L	B 24	Flange DN 150, PN 16 Form C, DIN 2501/316L	B 85
Flange DN 50, PN 40 Form C, DIN 2501/316L	B 25	Flange DN 150, PN 16 Form C, DIN 2501/Hastelloy	B 86
Flange DN 50, PN 40 Form C, DIN 2501/Hastelloy	B 26	Flange DN 150, PN 16 Form C, DIN 2501/ECTFE ⁵⁾	B 87
Flange DN 50, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 27	Flange DN 150, PN 16 Form C, DIN 2501/PFA ⁵⁾	B 88
Flange DN 50, PN 40 Form C, DIN 2501/ECTFE (ZB3108) ⁵⁾	B 28	Flange DN 150, PN 16 Form D, DIN 2501/316L	C 00
Flange DN 50, PN 40 Form C, DIN 2501/PFA ⁵⁾	B 30	Flange DN 150, PN 40 Form C, DIN 2501/316L	C 01
Flange DN 50, PN 40 Form D, DIN 2501/316L	B 31	Flange DN 150, PN 40 Form C, DIN 2501/Hastelloy	C 02
Flange DN 50, PN 40 Form D, DIN 2501/Hastelloy	B 32	Flange DN 150, PN 40 Form F, DIN 2501/316L	C 03
Flange DN 50, PN 40 Form F, DIN 2501/316L	B 33	Flange DN 150, PN 40 Form N, DIN 2512/316L	C 04
Flange DN 50, PN 40 Form N, DIN 2501/316L	B 34	Flange DN 200, PN 10 Form C, DIN 2501/ECTFE ⁵⁾	C 05
Flange DN 50, PN 40 Form N, DIN 2501/Hastelloy	B 35	Flange DN 200, PN 16 Form C, DIN 2501/316L	C 06
Flange DN 50, PN 40 Form E, DIN 2501/316L	B 36	Flange DN 25, PN 40 Form B1, EN 1092-1/316L	C 07
Flange DN 50, PN 40 V13, DIN 2501/316L	B 37	Flange DN 25, PN 40 Form B1, EN 1092-1/Hastelloy	C 08
Flange DN 50, PN 40 R13, DIN 2501/316L	B 38	Flange DN 25, PN 40 Form B1, EN/ 316L/ PFA ⁵⁾	C 10
Flange DN 50, PN 64 Form F, DIN 2501/316L	B 40	Flange DN 25, PN 40 Form B1, EN 1092-1/Enamelled ⁶⁾	C 11
Flange DN 50, PN 64 Form N, DIN 2501/Hastelloy	B 41	Flange DN 25, PN 40 Form B2, EN 1092-1/316L	C 12
Flange DN 50, PN 64 Form C, DIN 2501/316L	B 42	Flange DN 25, PN 40 Form F, EN 1092-1/316L	C 13
Flange DN 50, PN 64 Form L, DIN 2501/316L	B 43	Flange DN 25, PN 63 Form B1, EN 1092-1/316L	C 14
Flange DN 50, PN 100 Form E, DIN 2501/316L	B 44	Flange DN 25, PN 100 Form B2, EN 1092-1/316L	C 15
Flange DN 50, PN 100 Form L, DIN 2501/316L	B 45	Flange DN 40, PN 40 Form B1, EN/ 316L	C 16
Flange DN 65, PN 40 Form C, DIN 2501/316L	B 46	Flange DN 40, PN 40 Form B1, EN 1092-1/PFA ⁵⁾	C 17
Flange DN 65, PN 40 Form C, DIN 2501/Hastelloy	B 47	Flange DN 40, PN 40 Form B2, EN/316L	C 18
Flange DN 65, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 48	Flange DN 50, PN 40 Form B1, EN/316L	C 20
Flange DN 65, PN 40 Form C, DIN 2501/PFA ⁵⁾	B 50	Flange DN 50, PN 40 Form B1, EN 1092-1/Hastelloy	C 21
Flange DN 65, PN 40 Form F, DIN 2501/316L	B 51	Flange DN 50, PN 40 Form B1, EN 1092-1/Monel ZB2977	C 22
Flange DN 65, PN 64 Form E, DIN 2501/316L	B 52	Flange DN 50, PN 40 Form B1, EN 1092-1/ECTFE ⁵⁾	C 23
Flange DN 80, PN 40 Form C, DIN 2501/316L	B 53	Flange DN 50, PN 40 Form B1, EN/ 316L/PFA ⁵⁾	C 24
Flange DN 80, PN 40 Form C, DIN 2501/ Hastelloy	B 54		
Flange DN 80, PN 40 Form C, DIN 2501/ECTFE ⁵⁾	B 55		

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data

Article No.

SITRANS LVL200, Standard

Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.

	7ML5746- A 0
Flange DN 50, PN 40 Form B1, EN 1092-1/Enamelled ⁶⁾	C 25
Flange DN 50, PN 40 Form C, EN 1092-1/316L	C 26
Flange DN 50, PN 40 Form D, EN/316L	C 27
Flange DN 50, PN 40 Form D, EN 1092-1/Hastelloy	C 28
Flange DN 50, PN 40 Form B2, EN 1092-1/316L	C 30
Flange DN 50, PN 40 Form E, EN 1092-1/316L	C 31
Flange DN 80, PN 40 Form B1, EN 1092-1/316L	C 32
Flange DN 80, PN 40 Form B1, EN 1092-1/Hastelloy	C 33
Flange DN 80, PN 40 Form B1, EN 1092-1/ECTFE ⁵⁾	C 34
Flange DN 80, PN 40 Form B1, EN 1092-1/Enamelled ⁶⁾	C 35
Flange DN 80, PN 40 Form B2, EN 1092-1/316L	C 36
Flange DN 100, PN 16 Form B1, EN 1092-1/316L	C 37
Flange DN 100, PN 16 Form B1, EN 1092-1/Hastelloy	C 38
Flange DN 100, PN 16 Form B1, EN 1092-1/Enamelled ⁶⁾	C 40
Flange DN 100, PN 40 Form B1, EN 1092-1/316L	C 41
Flange DN 100, PN 40 Form B1, EN 1092-1/Enamelled ⁶⁾	C 42
Flange DN 100, PN 40 Form C, EN 1092-1/316L	C 43
Flange DN 100, PN 63 Form B2, EN 1092-1/316L	C 44
Flange DN 150, PN 16 Form B1, EN 1092-1/316L	C 45
Flange DN 150, PN 16 Form B1, EN 1092-1/PFA ⁵⁾	C 46
Flange DN 150, PN 40 Form B1, EN 1092-1/316L	C 47
Flange DN 150, PN 40 Form B1, EN 1092-1/ECTFE ⁵⁾	C 48
Flange DN 150, PN 40 Form B2, EN 1092-1/316L	C 50
Flange 1" 150 lb ANSI B16.5/316L	C 51
Flange 1" 150 lb RF, ANSI B16.5/Hastelloy	C 52
Flange 1" 150 lb RF, ANSI B16.5/Monel ZB2977	C 53
Flange 1" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	C 54
Flange 1" 150 lb RF, ANSI B16.5/PFA ⁵⁾	C 55
Flange 1" 150 lb RF, ANSI B16.5/Enamelled ⁶⁾	C 56
Flange 1" 300 lb RF, ANSI B16.5/316L	C 57
Flange 1" 300 lb RF, ANSI B16.5/ECTFE ⁵⁾	C 58
Flange 1" 600 lb RF, ANSI B16.5/316L	C 60
Flange 1½" 150 lb RF, ANSI B16.5/316L	C 61
Flange 1½" 150 lb RF, ANSI B16.5/Hastelloy	C 62
Flange 1½" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	C 63
Flange 1½" 150 lb RF, ANSI B16.5/PFA ⁵⁾	C 64
Flange 1½" 150 lb RF, ANSI B16.5/Enamelled ⁶⁾	C 65
Flange 1½" 150 lb FF, ANSI B16.5/ECTFE ⁵⁾	C 66
Flange 1½" 300 lb RF, ANSI B16.5/316L	C 67
Flange 1½" 300 lb RF, ANSI B16.5/Monel ZB2977	C 68
Flange 1½" 300 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 70
Flange 1½" 600 lb RF, ANSI B16.5/316L	C 71
Flange 2" 150 lb RF, ANSI B16.5/316L	C 72
Flange 2" 150 lb RF, ANSI B16.5/Hastelloy	C 73
Flange 2" 150 lb RF, ANSI B16.5/Monel ZB2977	C 74
Flange 2" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	C 75
Flange 2" 150 lb RF, ANSI B16.5/PFA ⁵⁾	C 76
Flange 2" 150 lb RF, ANSI B16.5/Enamelled ⁶⁾	C 77
Flange 2" 150 lb FF, ANSI B16.5/316L	C 78
Flange 2" 150 lb FF, ANSI B16.5/ECTFE ⁵⁾	C 80
Flange 2" 150 lb SG (small groove), ANSI B16.5/316L	C 81

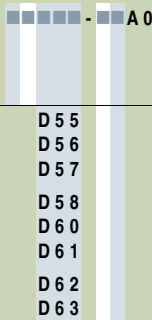
Selection and Ordering data

Article No.

SITRANS LVL200, Standard

Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.

	7ML5746- A 0
Flange 2" 300 lb RF, ANSI B16.5/316L	C 82
Flange 2" 300 lb RF, ANSI B16.5/Hastelloy	C 83
Flange 2" 300 lb RF, ANSI B16.5/ECTFE ⁵⁾	C 85
Flange 2" 300 lb RF, ANSI B16.5/PFA ⁵⁾	C 86
Flange 2" 300 lb RF, ANSI B16.5/Enamelled ⁶⁾	C 87
Flange 2" 300 lb RJF, ANSI B16.5/316L	C 88
Flange 2" 300 lb ST, ANSI B16.5/316L	D 00
Flange 2" 300 lb LG (large groove), ANSI B16.5/316L	D 01
Flange 2" 300 lb LT, ANSI B16.5/316L	D 02
Flange 2" 600 lb RF, ANSI B16.5/316L	D 03
Flange 2" 600 lb RF, ANSI B16.5/Monel ZB2977	D 04
Flange 2" 600 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 05
Flange 2" 600 lb RJF, ANSI B16.5/316L	D 06
Flange 2" 600 lb LG, ANSI B16.5/316L	D 07
Flange 2" 900 lb RJF, ANSI B16.5/316L	D 08
Flange 2½" 150 lb RF, ANSI B16.5/316L	D 10
Flange 2½" 300 lb RF, ANSI B16.5/316L	D 11
Flange 3" 150 lb RF, ANSI B16.5/316L	D 12
Flange 3" 150 lb RF, ANSI B16.5/Hastelloy	D 13
Flange 3" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 14
Flange 3" 150 lb RF, ANSI B16.5/PFA ⁵⁾	D 15
Flange 3" 150 lb RF, ANSI B16.5/Enamelled ⁶⁾	D 16
Flange 3" 150 lb FF, ANSI B16.5/316L	D 17
Flange 3" 150 lb FF, ANSI B16.5/ECTFE ⁵⁾	D 18
Flange 3" 150 lb FF, ANSI B16.5/PFA ⁵⁾	D 20
Flange 3" 300 lb RF, ANSI B16.5/316L	D 21
Flange 3" 300 lb RF, ANSI B16.5/Hastelloy	D 22
Flange 3" 300 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 23
Flange 3" 300 lb RF, ANSI B16.5/PFA ⁵⁾	D 24
Flange 3" 300 lb RF, ANSI B16.5/Enamelled ⁶⁾	D 25
Flange 3" 600 lb RF, ANSI B16.5/316L	D 26
Flange 3½" 150 lb RF, ANSI B16.5/316L	D 27
Flange 3½" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 28
Flange 4" 150 lb RF, ANSI B16.5/316L	D 30
Flange 4" 150 lb RF, ANSI B16.5/Hastelloy	D 31
Flange 4" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 32
Flange 4" 150 lb RF, ANSI B16.5/PFA ⁵⁾	D 33
Flange 4" 150 lb RF, ANSI B16.5/Enamelled ⁶⁾	D 34
Flange 4" 150 lb LT, ANSI B16.5/316L	D 35
Flange 4" 300 lb RF, ANSI B16.5/316L	D 36
Flange 4" 300 lb RF, ANSI B16.5/Hastelloy	D 37
Flange 4" 300 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 38
Flange 4" 300 lb RJF, ANSI B16.5/316L	D 40
Flange 4" 300 lb LG, ANSI B16.5/316L	D 41
Flange 4" 300 lb LT, ANSI B16.5/316L	D 42
Flange 4" 600 lb RF, ANSI B16.5/316L	D 43
Flange 4" 600 lb RJF, ANSI B16.5/316L	D 44
Flange 6" 150 lb RF, ANSI B16.5/316L	D 45
Flange 6" 150 lb RF, ANSI B16.5/Hastelloy	D 46
Flange 6" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 47
Flange 6" 150 lb RF, ANSI B16.5/PFA ⁵⁾	D 48
Flange 6" 150 lb RJF, ANSI B16.5/316L	D 50
Flange 6" 300 lb RF, ANSI B16.5/316L	D 51
Flange 8" 150 lb RF, ANSI B16.5/316L	D 52
Flange 8" 150 lb RF, ANSI B16.5/ECTFE ⁵⁾	D 53
Flange 1" BS.10 Table E/316L	D 54

Selection and Ordering data	Article No.
SITRANS LVL200, Standard Compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	7ML5746-  A 0
Flange 1" BS.10 Table E/PFA ⁵⁾	D 5 5
Flange 1½" BS.10 Table E/316L	D 5 6
Flange 3½" BS.10 Table E/316L	D 5 7
Flange 4" BS.10 Table E/ECTFE ⁵⁾	D 5 8
Flange DN 40 10K, JIS/316L	D 6 0
Flange DN 50 10K, JIS/316L	D 6 1
Flange DN 80 10K, JIS/316L	D 6 2
Flange DN 100 10K, JIS/316L	D 6 3
Adapter/Process temperature	
Without adapter/-50 ... +150 °C (-58 ... +302 °F)	1
With adapter/-50 ... +200 °C (-58 ... +392 °F) ⁷⁾	2
With adapter/-50 ... +250 °C (-58 ... +482 °F)	3
With gas-tight leadthrough/-50 ... +150 °C (-58 ... +302 °F)	4
With gas-tight leadthrough/-50 ... +250 °C (-58 ... +482 °F)	5
Housing/ Cable entry	
Aluminium IP66/IP67/M20x1.5	A
Aluminium IP66/IP67/½" NPT	B
316L stainless steel (electropolished) IP66/IP67/M20X1.5 ⁸⁾	C
316L stainless steel (electropolished) IP66/IP67/½" NPT ⁸⁾	D

1) Available with Adapter/Process temperature options 1, 3, 4, and 5 only
 2) Available with Electronics option 4 only
 3) Available with Adapter/Process temperature options 1 and 3 only
 4) Available with Housing/Cable entry option B only
 5) Available with Adapter/Process temperature options 1 and 4 only
 6) Available with Adapter/Process temperature options 1, 2, and 4 only
 7) Available with enamelled Process connection options only
 8) Available with Approval options A, B, C only
 9) Not available with SIL/IEC61508 Certificate of conformity (SIL-2 min. and max. detection)

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cleaning including Certificate (oil, grease, and silicone free)	W01
Identification Label (measurement loop) stainless steel: max. 16 characters add in plain text	Y17
Identification Label (measurement loop) Foil: max. 16 characters add in plain text	Y18
Acceptance test certificate 3.1 NACE MR 0775 for material EN10204 ¹⁾	D07
Acceptance test certificate 3.1 for instrument EN10204 ¹⁾	C12
Acceptance test Certificate 2.2 for material EN10204 ¹⁾	C15

Selection and Ordering data	Order code
Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ¹⁾	C20
Dye penetration test + 3.1 certificate/instrument ¹⁾	C13
X-ray test + 3.1 certificate/instrument ¹⁾	C14
Positive material identification test + 3.1 certificate/instrument ¹⁾	C16
Roughness test + 3.1 certificate/instrument ¹⁾	C18
Pressure test + 3.1 certificate/instrument ¹⁾	C31
Helium leak test + 3.1 certificate/instrument ¹⁾	C32
Ferrite measuring accuracy to DIN32514-1 + 3.1 certificate/instrument ¹⁾	C60
Pressure test according to Norsok + 3.1 certificate/instrument ¹⁾	C61
Additional Operating Instructions	Article No.
<u>LVL200 (DPDT Relay)</u>	
• English	7ML1998-5KR01
• French	7ML1998-5KR11
• Spanish	7ML1998-5KR21
• German	7ML1998-5KR31
<u>LVL200 (Contactless electronic switch)</u>	
• English	7ML1998-5KQ01
• French	7ML1998-5KQ11
• Spanish	7ML1998-5KQ21
• German	7ML1998-5KQ31
<u>Electronics module LVL200 Relay</u>	
• English	7ML1998-5LS01
• French	7ML1998-5LS11
• Spanish	7ML1998-5LS21
• German	7ML1998-5LS31
This device is shipped with the Siemens Milltronics manual DVD containing the Operating Instructions library.	

Spare Parts and Accessories	Order code
Electronics module SITRANS LVL200 Relay	7ML1830-1NC
Electronics module SITRANS LVL200 Contactless LVL200 Threaded Welded Socket	7ML1930-6AA
• G¾" A/316L with FKM Seal	7ML1930-1EE
• G1" A/316L with FKM Seal	7ML1930-1EF
• M27x1.5/316L with FKM Seal	7ML1930-1EG
• G¾" A/316L with EPDM Seal	7ML1930-1EH
• G1" A/316L with EPDM Seal	7ML1930-1EJ
• M27x1.5/316L with EPDM Seal	7ML1930-1EK

¹⁾ Listed Certificates are not available with all configurations, please contact factory for more information

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data	Article No.
SITRANS LVL200, Rigid extension	7ML5747-
Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	
➔ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Electronics	
Contactless electronic switch 20...250 V AC/DC	1
Double relay (DPDT) 20 ... 72 V DC/20 ... 250 V AC	2
NAMUR signal ⁽¹⁾	4
Approvals	
Without approvals	A
Overfill protection (WHG)	B
ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG ⁽²⁾	C
ATEX II 1/2G, 2G EEx d IIC T6 + WHG ^(3/4)	D
ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + shipping approvals ⁽²⁾	E
ATEX II 1/2G, 2G EEx d IIC T6 + shipping approvals ^(3/4)	F
ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + ATEX II 1/2D IP6X T ⁽²⁾	G
IECEX Ex ia IIC T6 ⁽²⁾	H
Shipping approvals	K
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ^(2/5)	N
FM (XP) Class I, Div. 1, Groups A, B, C, D; (DIP) Class II, III, Div. 1, Groups E, F, G ^(3/4/5)	P
FM (NI) Class I, Div. 2, Groups A, B, C, D ⁽⁵⁾	Q
IECEX d IIC T6...T2 Ga/Gb ⁽⁴⁾	R
CSA(XP)CL I,II,III Div. 1, Groups A, B, C, D, E, F, G...T2 ⁽⁴⁾ Ga/Gb	S
CSA(NI)CL I,II,III, Div. 2, Groups A, B, C, D, E, F, G	T
BR-Ex d IIC T6...T2	U
CSA(IS)CL I, II, III Div. 1, Groups A, B, C, D, E, F, G	V
Process connection	
Thread G ^{3/4} " A, PN 64/316L	A 00
Thread G ^{3/4} " A, PN 64/316L Ra < 0.8 µm	A 01
Thread ^{3/4} " NPT, PN 64/316L	A 02
Thread ^{3/4} " NPT, PN 64/316L Ra < 0.8 µm	A 03
Thread ^{3/4} " NPT, PN 64/Monel	A 04
Thread G ^{3/4} " A, PN 64/Hastelloy	A 05
Thread ^{3/4} " NPT, PN 64/Hastelloy	A 06
Thread G1" A, PN 64/316L	A 07
Thread G1" A, PN 64/316L ECTFE coated MB1982 ⁽⁶⁾	A 08
Thread G1" A, PN 64/316L PFA coated ⁽⁶⁾	A 10
Thread G1" A, PN 64/Monel	A 11
Thread G1" A, PN 64/316L Ra < 0.8 µm	A 13
Thread 1" NPT, PN 64/316L	A 14
Thread 1" NPT, PN 64/316L ECTFE coated MB1982 ⁽⁶⁾	A 15
Thread 1" NPT, PN 64/316L PFA coated ⁽⁶⁾	A 16
Thread 1" NPT, PN 64/Monel	A 17
Thread 1" NPT, PN 64/316L Ra < 0.8 µm	A 18
Thread G1" A, PN 64/Hastelloy	A 20
Thread G1 ^{1/2} " A, PN 64/316L	A 21
Thread G1 ^{1/2} " A, PN 64/316L Ra < 0.8 µm	A 22
Thread G1 ^{1/2} " A, PN 64/Hastelloy	A 23
Thread 1" NPT, PN 64/Hastelloy	A 24
Thread 1 ^{1/2} " NPT, PN 64/316L	A 25
Thread 1 ^{1/2} " NPT, PN 64/316L Ra < 0.8 µm	A 26
Thread 1 ^{1/2} " NPT, PN 64/Hastelloy	A 27
Thread G2" A, PN 64/316L	A 28
Thread M27x1.5 PN 64/316L	A 30

Selection and Ordering data	Article No.
SITRANS LVL200, Rigid extension	7ML5747-
Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	
Cyl. socket/316Ti/1.4581 ECTFE coated ZB2984 ⁽⁶⁾	A 31
Conus DN 25 PN 40/316L Ra < 0.3 µm	A 32
Conus DN 25 PN 40/316L Ra < 0.8 µm.	A 33
Conus DN 25 PN 40/ECTFE (ZB3033) ⁽⁶⁾	A 34
Conus M52 PN 40/316L	A 35
Conus M52 PN 40/316L Ra < 0.3 µm	A 36
Conus M52 PN 40/316L Ra < 0.8 µm	A 37
Tri-Clamp 1" PN 16/316L Ra < 0.3 µm	A 38
Tri-Clamp 1" PN 16/Hastelloy	A 40
Tri-Clamp 1" PN 16/316L Ra < 0.8 µm	A 41
Tri-Clamp 1 ^{1/2} " PN 16/316L Ra < 0.3 µm	A 42
Tri-Clamp 1 ^{1/2} " PN 16/Hastelloy	A 43
Tri-Clamp 1 ^{1/2} " PN 16/316L Ra < 0.8 µm	A 44
Tri-Clamp 2" PN 16/316L Ra < 0.3 µm	A 45
Tri-Clamp 2" PN 16/Hastelloy	A 46
Tri-Clamp 2" PN 16/316L Ra < 0.8 µm	A 47
Tri-Clamp 2 ^{1/2} " PN 10/316L Ra < 0.3 µm	A 48
Tri-Clamp 2 ^{1/2} " PN 10/316L Ra < 0.8 µm	A 50
Tri-Clamp 3" PN 10/316L Ra < 0.3 µm	A 51
Tri-Clamp 3" PN 10/316L Ra < 0.8 µm	A 52
Bolting DN 32 PN 40 DIN11851/316L Ra < 0.3 µm	A 53
Bolting DN 32 PN 40 DIN11851/316L Ra < 0.8 µm	A 54
Bolting DN 25 PN 40 DIN11851/316L Ra < 0.3 µm	A 55
Bolting DN 25 PN 40 DIN11851/316L Ra < 0.8 µm	A 56
Bolting DN 40 PN 40 DIN11851/316L Ra < 0.3 µm	A 57
Bolting DN 40 PN 40 DIN11851/316L Ra < 0.8 µm	A 58
Bolting DN 40 PN 40 DIN11864-1 A/316L Ra < 0.8 µm ZB3052	A 60
Bolting DN 50 PN 25 DIN11851/316L Ra < 0.3 µm	A 61
Bolting DN 50 PN 25 DIN11851/316L Ra < 0.8 µm	A 62
Bolting DN 50 PN 25 DIN11864-1 A/316L Ra < 0.8 µm ZB3052	A 63
Hygienic w.compr.nut F40 PN 25/316L	A 64
Hygienic w.compr.nut F40 PN 25/316L Ra < 0.3 µm	A 65
Hygienic w.compr.nut F40 PN 25/316L Ra < 0.8 µm	A 66
Varivent N50-40/316L Ra < 0.3 µm	A 67
Varivent N50-40/316L Ra < 0.8 µm	A 68
Varivent N125/100/316L Ra < 0.8 µm	A 70
DRD flange PN 40/316L ZB3007	A 71
SMS DN 38/316L Ra < 0.8 µm ⁽⁶⁾	A 72
SMS DN 51 PN 6/316L Ra < 0.8 µm ⁽⁶⁾	A 73
Swagelok VCR screwing ZG2579 PN 64/316L	A 74
Neumo biocontrol size 25 PN 16/316L Ra < 0.8 µm	A 75
Neumo biocontrol size 50 PN 16/316L Ra < 0.8 µm	A 76
Neumo biocontrol size 65 PN 16/316L Ra < 0.8 µm	A 77
Neumo biocontrol size 80 PN 16/316L Ra < 0.8 µm	A 78
SÜDMO DN 50 PN 10/316L Ra < 0.8 µm	A 80
Small flange DN 25 PN 1.5 DIN 28403/316L pol. Ra < 0.8 µm	A 81
Small flange DN 40 PN 1.5 DIN 28403/316L pol. Ra < 0.8 µm	A 82
Ingold connection PN 16/316L Ra < 0.8 µm	A 83
Terminal DN 33.7 PN 40 DIN 11864-3-A-/316L BN2 Ra < 0.8 µm	A 84
Hygienic fl. DN 50 PN 16 DIN 11864-2-A-/316L Ra < 0.8 µm	A 85
Flange DN 25 PN 6 Form C, DIN 2501/316L	A 86

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LVL200, Rigid extension	7ML5747-	SITRANS LVL200, Rigid extension	7ML5747-
Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.		Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	
Flange DN 25 PN 6 Form C, DIN 2501/PFA ⁶⁾	A 8 7	Flange DN 80 PN 40 Form N, DIN 2501/316L	B 5 7
Flange DN 25 PN 40 Form C, DIN 2501/316L	A 8 8	Flange DN 80 PN 40 Form N, DIN 2501/Hastelloy	B 5 8
Flange DN 25 PN 40 Form C, DIN 2501/Hastelloy	B 0 0	Flange DN 100 PN 16 Form C, DIN 2501/316L	B 6 0
Flange DN 25 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 0 1	Flange DN 100 PN 16 Form C, DIN 2501/Hastelloy	B 6 1
Flange DN 25 PN 40 Form C, DIN 2501/PFA ⁶⁾	B 0 2	Flange DN 100 PN 16 Form C, DIN 2501/ECTFE ⁶⁾	B 6 2
Flange DN 25 PN 40 Form D, DIN 2501/316L	B 0 3	Flange DN 100 PN 16 Form C, DIN 2501/PFA ⁶⁾	B 6 3
Flange DN 25 PN 40 Form F, DIN 2501/316L	B 0 4	Flange DN 100 PN 16 Form D, DIN 2501/316L	B 6 4
Flange DN 25 PN 40 Form N, DIN 2501/316L	B 0 5	Flange DN 100 PN 16 Form F, DIN 2501/316L	B 6 5
Flange DN 25 PN 40 Form N, DIN 2501/Hastelloy	B 0 6	Flange DN 100 PN 16 Form N, DIN 2501/316L	B 6 6
Flange DN 25 PN 40 Form N, DIN 2501/Monel solid	B 0 7	Flange DN 100 PN 40 Form C, DIN 2501/316L	B 6 7
Flange DN 25 PN 40 V13, DIN 2501/316L	B 0 8	Flange DN 100 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 6 8
Flange DN 32 PN 40 Form C, DIN 2501/316L	B 1 0	Flange DN 100 PN 40 Form C, DIN 2501/PFA ⁶⁾	B 7 0
Flange DN 32 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 1 1	Flange DN 100 PN 40 Form C, DIN 2501/Enamelled ⁷⁾	B 7 1
Flange DN 40 PN 6 Form C, DIN 2501/316L	B 1 2	Flange DN 100 PN 40 Form F, DIN 2501/316L	B 7 2
Flange DN 40 PN 6 Form C, DIN 2501/ECTFE ⁶⁾	B 1 3	Flange DN 100 PN 40 Form N, DIN 2501/316L	B 7 3
Flange DN 40 PN 40 Form C, DIN 2501/316L	B 1 4	Flange DN 100 PN 40 V13, DIN 2501/316L	B 7 4
Flange DN 40 PN 40 Form C, DIN 2501/Hastelloy	B 1 5	Flange DN 100 PN 64 Form E, DIN 2501/316L	B 7 5
Flange DN 40 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 1 6	Flange DN 100 PN 100 Form E, DIN 2501/316L	B 7 6
Flange DN 40 PN 40 Form C, DIN 2501/PFA ⁶⁾	B 1 7	Flange DN 100 PN 100 Form L, DIN 2501/316L	B 7 7
Flange DN 40 PN 40 Form C, DIN 2501/Enamelled ⁷⁾	B 1 8	Flange DN 125 PN 16 Form F, DIN 2501/316L	B 7 8
Flange DN 40 PN 40 Form F, DIN 2501/316L	B 2 0	Flange DN 125 PN 40 Form C, DIN 2501/316L	B 8 0
Flange DN 40 PN 40 Form N, DIN 2501/316L	B 2 1	Flange DN 125 PN 40 Form N, DIN 2512/316L	B 8 1
Flange DN 40 PN 40 Form E, DIN 2501/316L	B 2 2	Flange DN 150 PN 16 Form C, DIN 2501/316L	B 8 2
Flange DN 40 PN 40 V13, DIN 2501/316L	B 2 3	Flange DN 150 PN 16 Form C, DIN 2501/Hastelloy	B 8 3
Flange DN 50 PN 40 Form C, DIN 2501/316L	B 2 4	Flange DN 150 PN 16 Form C, DIN 2501/ECTFE ⁶⁾	B 8 4
Flange DN 50 PN 40 Form C, DIN 2501/Hastelloy	B 2 5	Flange DN 150 PN 16 Form C, DIN 2501/PFA ⁶⁾	B 8 5
Flange DN 50 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 2 6	Flange DN 150 PN 16 Form D, DIN 2501/316L	B 8 6
Flange DN 50 PN 40 Form C, DIN 2501/ECTFE (ZB3108) ⁶⁾	B 2 7	Flange DN 150 PN 40 Form C, DIN 2501/316L	B 8 7
Flange DN 50 PN 40 Form C, DIN 2501/PFA ⁶⁾	B 2 8	Flange DN 150 PN 40 Form C, DIN 2501/Hastelloy	B 8 8
Flange DN 50 PN 40 Form D, DIN 2501/316L	B 3 0	Flange DN 150 PN 40 Form F, DIN 2501/316L	C 0 0
Flange DN 50 PN 40 Form D, DIN 2501/Hastelloy	B 3 1	Flange DN 150 PN 40 Form N, DIN 2512/316L	C 0 1
Flange DN 50 PN 40 Form F, DIN 2501/316L	B 3 2	Flange DN 200 PN 10 Form C, DIN 2501/ECTFE ⁶⁾	C 0 2
Flange DN 50 PN 40 Form N, DIN 2501/316L	B 3 3	Flange DN 200 PN 16 Form C, DIN 2501/316L	C 0 3
Flange DN 50 PN 40 Form N, DIN 2501/Hastelloy	B 3 4	Flange DN 25 PN 40 Form B1, EN 1092-1/316L	C 0 4
Flange DN 50 PN 40 Form E, DIN 2501/316L	B 3 5	Flange DN 25 PN 40 Form B1, EN 1092-1/Hastelloy	C 0 5
Flange DN 50 PN 40 V13, DIN 2501/316L	B 3 6	Flange DN 25 PN 40 Form B1, EN/316L/PFA ⁶⁾	C 0 6
Flange DN 50 PN 40 R13, DIN 2501/316L	B 3 7	Flange DN 25 PN 40 Form B1, EN 1092-1/Enamelled ⁷⁾	C 0 7
Flange DN 50 PN 64 Form F, DIN 2501/316L	B 3 8	Flange DN 25 PN 40 Form B2, EN 1092-1/316L	C 0 8
Flange DN 50 PN 64 Form N, DIN 2501/Hastelloy	B 4 0	Flange DN 25 PN 40 Form F, EN 1092-1/316L	C 1 0
Flange DN 50 PN 64 Form C, DIN 2501/316L	B 4 1	Flange DN 25 PN 63 Form B1, EN 1092-1/316L	C 1 1
Flange DN 50 PN 64 Form L, DIN 2501/316L	B 4 2	Flange DN 25 PN 100 Form B2, EN 1092-1/316L	C 1 2
Flange DN 50 PN 100 Form E, DIN 2501/316L	B 4 3	Flange DN 40 PN 40 Form B1, EN/316L	C 1 3
Flange DN 50 PN 100 Form L, DIN 2501/316L	B 4 4	Flange DN 40 PN 40 Form B1, EN 1092-1/PFA ⁶⁾	C 1 4
Flange DN 65 PN 40 Form C, DIN 2501/316L	B 4 5	Flange DN 40 PN 40 Form B2, EN/316L	C 1 5
Flange DN 65 PN 40 Form C, DIN 2501/Hastelloy	B 4 6	Flange DN 50 PN 40 Form B1, EN/316L	C 1 6
Flange DN 65 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 4 7	Flange DN 50 PN 40 Form B1, EN 1092-1/Hastelloy	C 1 7
Flange DN 65 PN 40 Form C, DIN 2501/PFA ⁶⁾	B 4 8	Flange DN 50 PN 40 Form B1, EN 1092-1/Monel ZB2977	C 1 8
Flange DN 65 PN 40 Form F, DIN 2501/316L	B 5 0	Flange DN 50 PN 40 Form B1, EN 1092-1/ECTFE ⁶⁾	C 2 0
Flange DN 65 PN 64 Form E, DIN 2501/316L	B 5 1	Flange DN 50 PN 40 Form B1, EN/316L/PFA ⁶⁾	C 2 1
Flange DN 80 PN 40 Form C, DIN 2501/316L	B 5 2	Flange DN 50 PN 40 Form B1, EN 1092-1/Enamelled ⁷⁾	C 2 2
Flange DN 80 PN 40 Form C, DIN 2501/Hastelloy	B 5 3	Flange DN 50 PN 40 Form C, EN 1092-1/316L	C 2 3
Flange DN 80 PN 40 Form C, DIN 2501/ECTFE ⁶⁾	B 5 4		
Flange DN 80 PN 40 Form C, DIN 2501/PFA ⁶⁾	B 5 5		
Flange DN 80 PN 40 Form F, DIN 2501/316L	B 5 6		

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data

Article No.

SITRANS LVL200, Rigid extension

Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.

Flange DN 50 PN 40 Form D, EN/316L	C 24
Flange DN 50 PN 40 Form D, EN 1092-1/ Hastelloy	C 25
Flange DN 50 PN 40 Form B2, EN 1092-1/316L	C 26
Flange DN 50 PN 40 Form E, EN 1092-1/316L	C 27
Flange DN 80 PN 40 Form B1, EN 1092-1/316L	C 28
Flange DN 80 PN 40 Form B1, EN 1092-1/Hastelloy	C 30
Flange DN 80 PN 40 Form B1, EN 1092-1/ECTFE ⁶⁾	C 31
Flange DN 80 PN 40 Form B1, EN 1092-1/ Enamelled ⁷⁾	C 32
Flange DN 80 PN 40 Form B2, EN 1092-1/316L	C 33
Flange DN 100 PN 16 Form B1, EN 1092-1/316L	C 34
Flange DN 100 PN 16 Form B1, EN 1092-1/ Hastelloy	C 35
Flange DN 100 PN 16 Form B1, EN 1092-1/ Enamelled ⁷⁾	C 36
Flange DN 100 PN 40 Form B1, EN 1092-1/316L	C 37
Flange DN 100 PN 40 Form B1, EN 1092-1/ Enamelled ⁷⁾	C 38
Flange DN 100 PN 40 Form C, EN 1092-1/316L	C 40
Flange DN 100 PN 63 Form B2, EN 1092-1/316L	C 41
Flange DN 150 PN 16 Form B1, EN 1092-1/316L	C 42
Flange DN 150 PN 16 Form B1, EN 1092-1/PFA ⁶⁾	C 43
Flange DN 150 PN 40 Form B1, EN 1092-1/316L	C 44
Flange DN 150 PN 40 Form B1, EN 1092-1/ ECTFE ⁶⁾	C 45
Flange DN 150 PN 40 Form B2, EN 1092-1/316L	C 46
Flange 1" 150 lb ANSI B16.5/316L	C 47
Flange 1" 150 lb RF, ANSI B16.5/Hastelloy	C 48
Flange 1" 150 lb RF, ANSI B16.5/Monel ZB2977	C 50
Flange 1" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 51
Flange 1" 150 lb RF, ANSI B16.5/PFA ⁶⁾	C 52
Flange 1" 150 lb RF, ANSI B16.5/Enamelled ⁷⁾	C 53
Flange 1" 300 lb RF, ANSI B16.5/316L	C 54
Flange 1" 300 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 55
Flange 1" 600 lb RF, ANSI B16.5/316L	C 56
Flange 1½" 150 lb RF, ANSI B16.5/316L	C 57
Flange 1½" 150 lb RF, ANSI B16.5/Hastelloy	C 58
Flange 1½" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 60
Flange 1½" 150 lb RF, ANSI B16.5/PFA ⁶⁾	C 61
Flange 1½" 150 lb RF, ANSI B16.5 Enamelled ⁷⁾	C 62
Flange 1½" 150 lb FF, ANSI B16.5/ECTFE ⁶⁾	C 63
Flange 1½" 300 lb RF, ANSI B16.5/316L	C 64
Flange 1½" 300 lb RF, ANSI B16.5/Monel ZB2977	C 65
Flange 1½" 300 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 66
Flange 1½" 600 lb RF, ANSI B16.5/316L	C 67
Flange 2" 150 lb RF, ANSI B16.5/316L	C 68
Flange 2" 150 lb RF, ANSI B16.5/Hastelloy	C 70
Flange 2" 150 lb RF, ANSI B16.5/Monel ZB2977	C 71
Flange 2" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 72
Flange 2" 150 lb RF, ANSI B16.5/PFA ⁶⁾	C 73
Flange 2" 150 lb RF, ANSI B16.5/Enamelled ⁷⁾	C 74
Flange 2" 150 lb FF, ANSI B16.5/316L	C 75
Flange 2" 150 lb FF, ANSI B16.5/ECTFE ⁶⁾	C 76
Flange 2" 150 lb SG (small groove), ANSI B16.5/316L	C 77
Flange 2" 300 lb RF, ANSI B16.5/316L	C 78
Flange 2" 300 lb RF, ANSI B16.5/Hastelloy	C 80

Selection and Ordering data

Article No.

SITRANS LVL200, Rigid extension

Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.

Flange 2" 300 lb RF, ANSI B16.5/ECTFE ⁶⁾	C 82
Flange 2" 300 lb RF, ANSI B16.5/PFA ⁶⁾	C 83
Flange 2" 300 lb RF, ANSI B16.5 Enamelled ⁷⁾	C 84
Flange 2" 300 lb RJF, ANSI B16.5/316L	C 85
Flange 2" 300 lb ST, ANSI B16.5/316L	C 86
Flange 2" 300 lb LG (large groove), ANSI B16.5/316L	C 87
Flange 2" 300 lb LT, ANSI B16.5/316L	C 88
Flange 2" 600 lb RF, ANSI B16.5/316L	D 00
Flange 2" 600 lb RF, ANSI B16.5/Monel ZB2977	D 01
Flange 2" 600 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 02
Flange 2" 600 lb RJF, ANSI B16.5/316L	D 03
Flange 2" 600 lb LG, ANSI B16.5/316L	D 04
Flange 2" 900 lb RJF, ANSI B16.5/316L	D 05
Flange 2½" 150 lb RF, ANSI B16.5/316L	D 06
Flange 2½" 300 lb RF, ANSI B16.5/316L	D 07
Flange 3" 150 lb RF, ANSI B16.5/316L	D 08
Flange 3" 150 lb RF, ANSI B16.5/Hastelloy	D 10
Flange 3" 150 lb RF, ANSI B16.5/Monel ZB2977	D 11
Flange 3" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 12
Flange 3" 150 lb RF, ANSI B16.5/PFA ⁶⁾	D 13
Flange 3" 150 lb RF, ANSI B16.5/Enamelled ⁷⁾	D 14
Flange 3" 150 lb FF, ANSI B16.5/316L	D 15
Flange 3" 150 lb FF, ANSI B16.5/ECTFE ⁶⁾	D 16
Flange 3" 150 lb FF, ANSI B16.5/PFA ⁶⁾	D 17
Flange 3" 300 lb RF, ANSI B16.5/316L	D 18
Flange 3" 300 lb RF, ANSI B16.5/Hastelloy	D 20
Flange 3" 300 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 21
Flange 3" 300 lb RF, ANSI B16.5/PFA ⁶⁾	D 22
Flange 3" 300 lb RF, ANSI B16.5/Enamelled ⁷⁾	D 23
Flange 3" 600 lb RF, ANSI B16.5/316L	D 24
Flange 3½" 150 lb RF, ANSI B16.5/316L	D 25
Flange 3½" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 26
Flange 4" 150 lb RF, ANSI B16.5/316L	D 27
Flange 4" 150 lb RF, ANSI B16.5/Hastelloy	D 28
Flange 4" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 30
Flange 4" 150 lb RF, ANSI B16.5/PFA ⁶⁾	D 31
Flange 4" 150 lb RF, ANSI B16.5/Enamelled ⁷⁾	D 32
Flange 4" 150 lb LT, ANSI B16.5/316L	D 33
Flange 4" 300 lb RF, ANSI B16.5/316L	D 34
Flange 4" 300 lb RF, ANSI B16.5/Hastelloy	D 35
Flange 4" 300 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 36
Flange 4" 300 lb RJF, ANSI B16.5/316L	D 37
Flange 4" 300 lb LG, ANSI B16.5/316L	D 38
Flange 4" 300 lb LT, ANSI B16.5/316L	D 40
Flange 4" 600 lb RF, ANSI B16.5/316L	D 41
Flange 4" 600 lb RJF, ANSI B16.5/316L	D 42
Flange 5" 150 lb RF, ANSI B16.5/316L	D 43
Flange 6" 150 lb RF, ANSI B16.5/316L	D 44
Flange 6" 150 lb RF, ANSI B16.5/Hastelloy	D 45
Flange 6" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 46
Flange 6" 150 lb RF, ANSI B16.5/PFA ⁶⁾	D 47
Flange 6" 150 lb RJF, ANSI B16.5/316L	D 48
Flange 6" 300 lb RF, ANSI B16.5/316L	D 50
Flange 8" 150 lb RF, ANSI B16.5/316L	D 51
Flange 8" 150 lb RF, ANSI B16.5/ECTFE ⁶⁾	D 52
Flange 1" BS.10 Table E/316L	D 53

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LVL200, Rigid extension Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	7ML5747-	SITRANS LVL200, Rigid extension Compact vibrating level switch for material detection in liquid applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 and hazardous applications.	7ML5747-
Flange 1" BS.10 Table E/PFA ⁶⁾	D 5 4	Rigid Extension 316L Ra ≤ 0.8 µm	
Flange 1½" BS.10 Table E/316L	D 5 5	80 ... 500 mm	D 0
Flange 3½" BS.10 Table E/316L	D 5 6	501 ... 1 000 mm	D 1
Flange 4" BS.10 Table E/ECTFE ⁶⁾	D 5 7	1 001 ... 1 500 mm	D 2
Flange DN 40 10K, JIS/316L	D 5 8	1 501 ... 2 000 mm	D 3
Flange DN 50 10K, JIS/316L	D 6 0	2 001 ... 2 500 mm	D 4
Flange DN 80 10K, JIS/316L	D 6 1	2 501 ... 3 000 mm	D 5
Flange DN 100 10K, JIS/316L	D 6 2	3 001 ... 3 500 mm	D 6
		3 501 ... 4 000 mm	D 7
Adapter/Process temperature		Rigid Extension 316L Ra ≤ 0.3 µm	
Without adapter/-50 ... +150 °C	1	80 ... 500 mm	E 0
With adapter/-50 ... +200 °C ⁸⁾	2	501 ... 1 000 mm	E 1
With adapter/-50... +250 °C	3	1 001 ... 1 500 mm	E 2
With gas-tight leadthrough/-50 ... +150 °C	4	1 501 ... 2 000 mm	E 3
With gas-tight leadthrough/-50 ... +250 °C	5	2 001 ... 2 500 mm	E 4
		2 501 ... 3 000 mm	E 5
Housing/ Cable entry		3 001 ... 3 500 mm	E 6
Aluminium IP66/IP67/M20x1.5	A	3 501 ... 4 000 mm	E 7
Aluminium IP66/IP67/½" NPT	B		
316L stainless steel (electropolished) IP66/IP67/M20X1.5 ⁹⁾ 10)	C	Rigid Extension Enamelled version⁷⁾	
316L stainless steel (electropolished) IP66/IP67/½" NPT ⁹⁾ 10)	D	80 ... 250 mm	F 0
		251 ... 500 mm	F 1
		501 ... 750 mm	F 2
		751 ... 1 000 mm	F 3
		1 001 ... 1 250 mm	F 4
		1 251 ... 1 500 mm	F 5
NOTE: When selecting a Rigid Extension option, extension coating must match the process connection coating and the material and surface roughness type.		Rigid Extension Hastelloy	
		80 ... 500 mm	G 0
		501 ... 1 000 mm	G 1
		1 001 ... 1 500 mm	G 2
		1 501 ... 2 000 mm	G 3
		2 001 ... 2 500 mm	G 4
		2 501 ... 3 000 mm	G 5
		3 001 ... 3 500 mm	G 6
		3 501 ... 4 000 mm	G 7
Rigid Extension 316L		Rigid Extension Monel	
80 ... 500 mm	A 0	80 ... 500 mm	H 0
501 ... 1 000 mm	A 1	501 ... 1 000 mm	H 1
1 001 ... 1 500 mm	A 2	1 001 ... 1 500 mm	H 2
1 501 ... 2 000 mm	A 3	1 501 ... 2 000 mm	H 3
2 001 ... 2 500 mm	A 4	2 001 ... 2 500 mm	H 4
2 501 ... 3 000 mm	A 5	2 501 ... 3 000 mm	H 5
3 001 ... 3 500 mm	A 6		
3 501 ... 4 000 mm	A 7		
Rigid Extension ECTFE coated⁶⁾			
80 ... 500 mm	B 0		
501 ... 1 000 mm	B 1		
1 001 ... 1 500 mm	B 2		
1 501 ... 2 000 mm	B 3		
2 001 ... 2 500 mm	B 4		
2 501 ... 3 000 mm	B 5		
Rigid Extension PFA coated⁶⁾			
80 ... 500 mm	C 0		
501 ... 1 000 mm	C 1		
1 001 ... 1 500 mm	C 2		
1 501 ... 2 000 mm	C 3		
2 001 ... 2 500 mm	C 4		
2 501 ... 3 000 mm	C 5		

1) Available with Adapter/Process temperature options 1, 3, 4, and 5 only

2) Available with Electronics option 4 only

3) Available with Adapter/Process temperature options 1 and 3 only

4) Extension length restricted to 2 956 mm

5) Available with Housing/Cable entry option B only

6) Available with Adapter/Process temperature options 1 and 4 only

7) Available with Adapter/Process temperature options 1, 2, and 4 only

8) Available with enamelled Process connection and Extension options only

9) Available with Approval options A, B, C only

10) Not available with SIL/IEC61508 Certificate of conformity (SIL-2 min. and max. detection)

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVL200

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Cleaning including Certificate (oil, grease and silicone free)

W01

Enter the total insertion length in plain text description, max. 4 000 mm (157.48 inch)

Y01

Identification Label (measurement loop) stainless steel: max. 16 characters add in plain text

Y17

Identification Label (measurement loop) Foil: max. 16 characters add in plain text

Y18

Acceptance test certificate 3.1 NACE MR 0775 for material EN10204¹⁾

D07

Acceptance test certificate 3.1 for instrument EN10204¹⁾

C12

Acceptance test Certificate 2.2 for material EN10204¹⁾

C15

Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511¹⁾

C20

Dye penetration test + 3.1 certificate/instrument¹⁾

C13

X-ray test + 3.1 certificate/instrument¹⁾

C14

Positive material identification test + 3.1 certificate/instrument¹⁾

C16

Roughness test + 3.1 certificate/instrument¹⁾

C18

Pressure test + 3.1 certificate/instrument¹⁾

C31

Helium leak test + 3.1 certificate/instrument¹⁾

C32

Ferrite measuring accuracy to DIN32514-1 + 3.1 certificate/instrument¹⁾

C60

Pressure test according to Norsok + 3.1 certificate/instrument¹⁾

C61

Additional Operating Instructions

Article No.

LVL200 Extended (DPDT Relay)

- English
- French
- Spanish
- German

7ML1998-5KW01

7ML1998-5KW11

7ML1998-5KW21

7ML1998-5KW31

LVL200 (Contactless electronic switch)

- English
- French
- Spanish
- German

7ML1998-5KV01

7ML1998-5KV11

7ML1998-5KV21

7ML1998-5KV31

Electronics module LVL200 Relay

- English
- French
- Spanish
- German

7ML1998-5LS01

7ML1998-5LS11

7ML1998-5LS21

7ML1998-5LS31

This device is shipped with the Siemens Milltronics manual DVD containing the Operating Instructions library.

Selection and Ordering data

Order code

Spare Parts and Accessories

Electronics module SITRANS LVL200 Relay

7ML1830-1NC

Electronics module SITRANS LVL200 Contactless

7ML1930-6AA

Lock fitting, unpressurized, G1" A/316L

7ML1930-1DQ

Lock fitting, unpressurized, 1" NPT/316L

7ML1930-1DR

Lock fitting, unpressurized, G1 ... 1/2" A/316L

7ML1930-1DS

Lock fitting, unpressurized, 1 ... 1/2" NPT/316L

7ML1930-1DT

Lock fitting, -1 ... 16 bar, G1" A/316L

7ML1930-1DU

Lock fitting, -1 ... 16 bar, 1" NPT/316L

7ML1930-1DV

Lock fitting, -1 ... 16 bar, G1 ... 1/2" A/316L

7ML1930-1DW

Lock fitting, -1 ... 16 bar, 1 ... 1/2" NPT/316L

7ML1930-1DX

Lock fitting, -1 ... 64 bar, G1" A/316L

7ML1930-1EA

Lock fitting, -1 ... 64 bar, 1" NPT/316L

7ML1930-1EB

Lock fitting, -1 ... 64 bar, G1 ... 1/2" A/316L

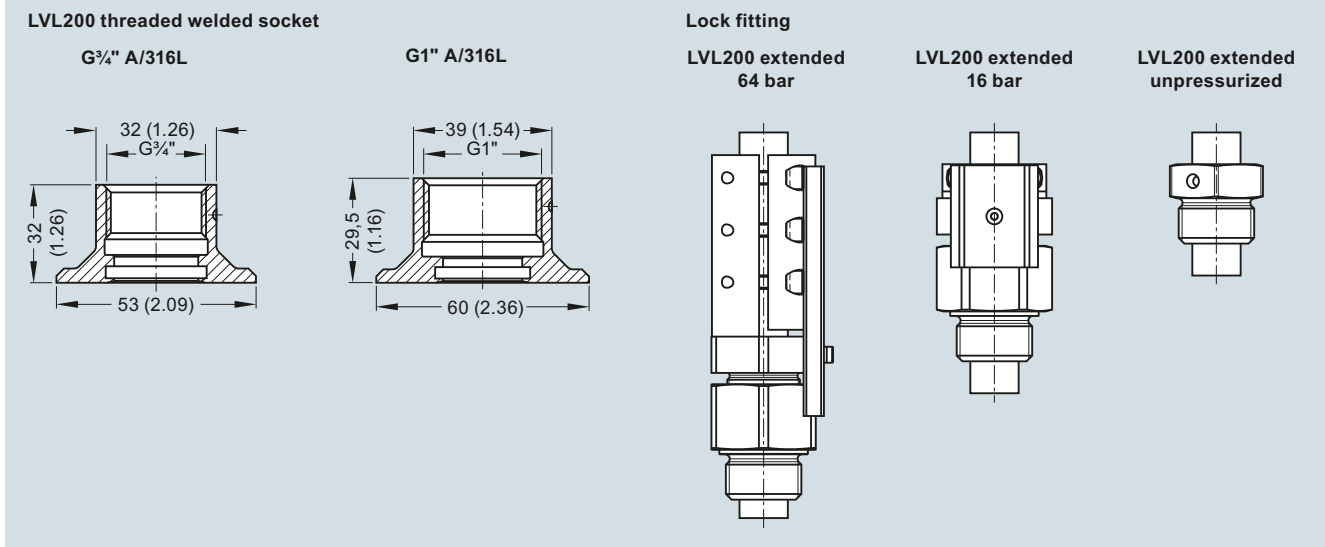
7ML1930-1EC

Lock fitting, -1 ... 64 bar, 1 ... 1/2" NPT/316L

7ML1930-1ED

¹⁾ Listed Certificates are not available with all configurations, please contact factory for more information

Options



SITRANS LVL200 welded socket and lock fitting, dimensions in mm (inch)

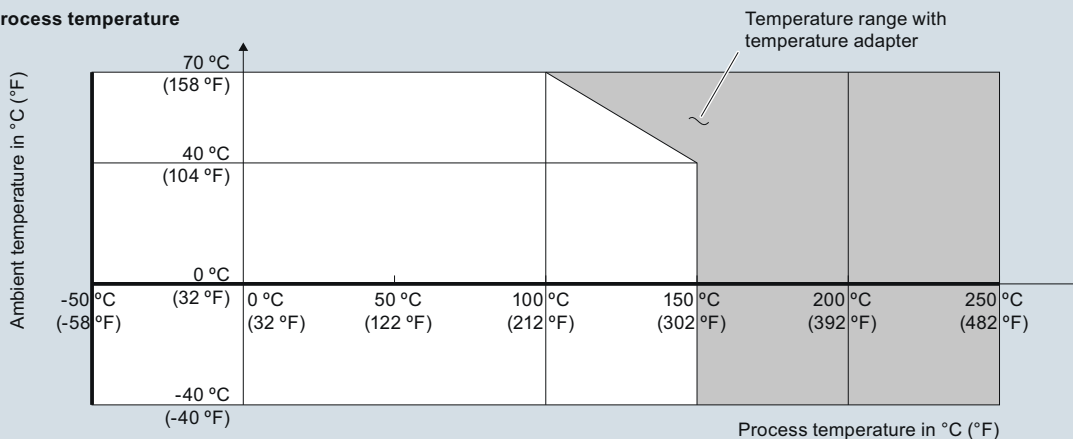
Level Measurement

Point level measurement – Vibrating switches

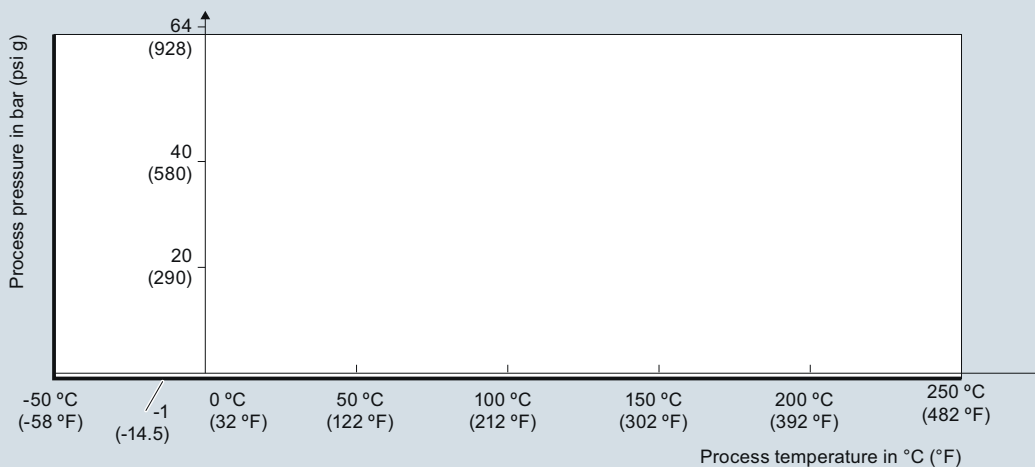
SITRANS LVL200

Characteristic curves

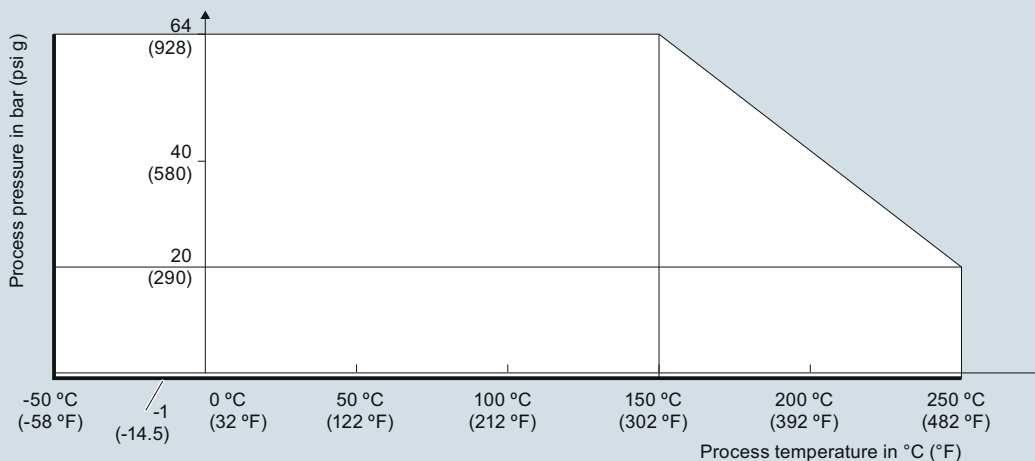
Ambient/Process temperature



Process pressure with switch position 0.7 g/cm³ (mode switch)

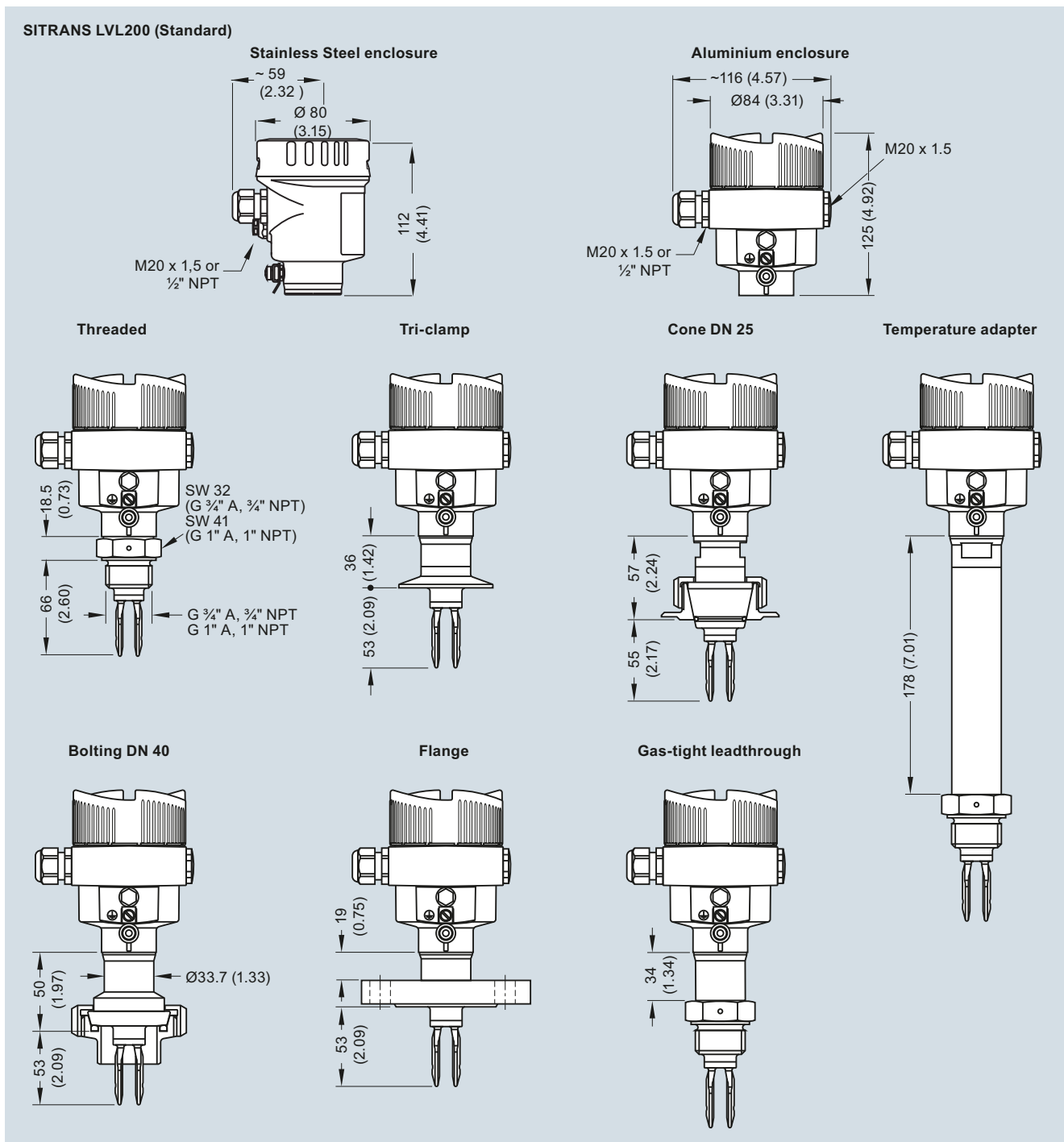


Process pressure with switch position 0.5 g/cm³ (mode switch)



SITRANS LVL200 Process Pressure/Process Temperature/Ambient Temperature derating curves

Dimensional drawings



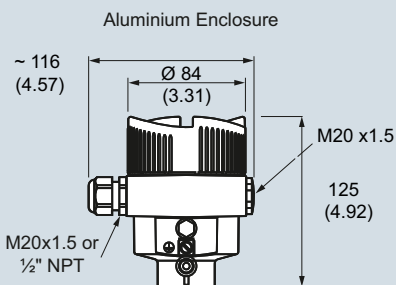
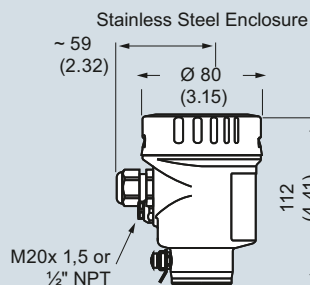
SITRANS LVL200 (Standard), dimensions in mm (inch)

Level Measurement

Point level measurement – Vibrating switches

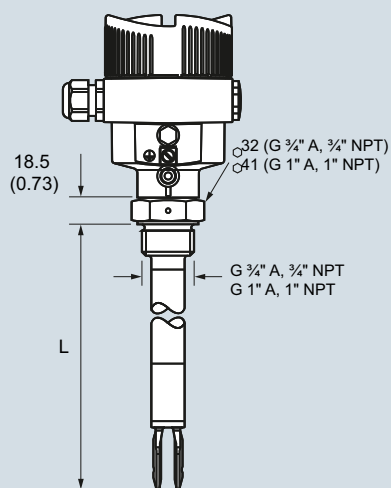
SITRANS LVL200

SITRANS LVL200 (Extended)

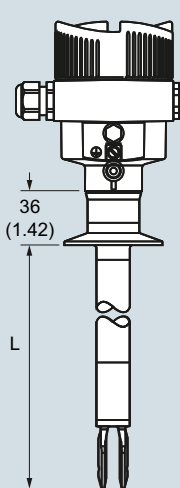


Sensor length (L)	
316L, Hastelloy C4 (2.4610)	80 ... 6 000 mm (3.15 ... 236.2 inch)
Hastelloy C4 (2.4610) enamelled	80 ... 1 500 mm (3.15 ... 59.06 inch)
316L, ECTFE coated	80 ... 3 000 mm (3.15 ... 118.1 inch)
316L, PFA coated	80 ... 3 000 mm (3.15 ... 118.1 inch)

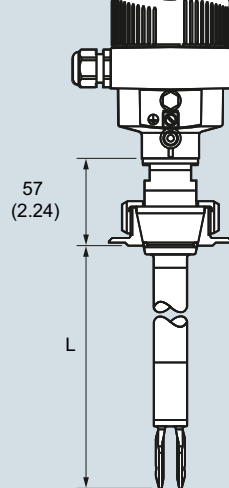
Threaded



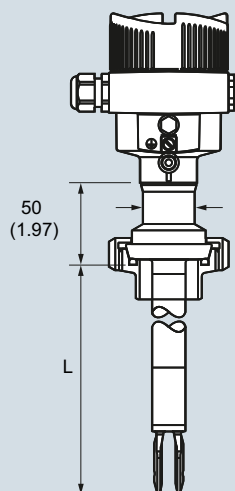
Tri-clamp



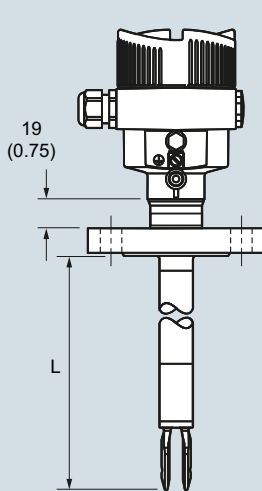
Cone DN 25



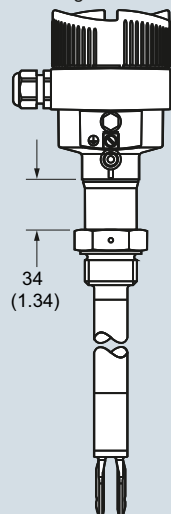
Bolting DN 40



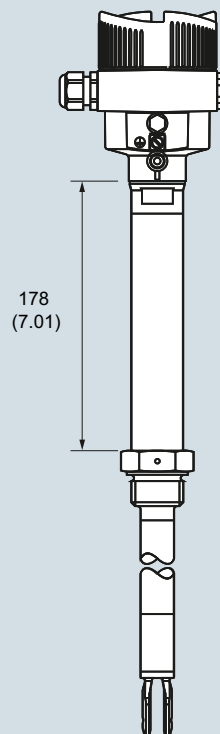
Flanged



Gas-tight leadthrough



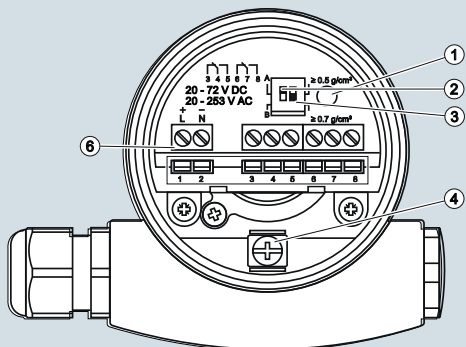
Temperature adapter



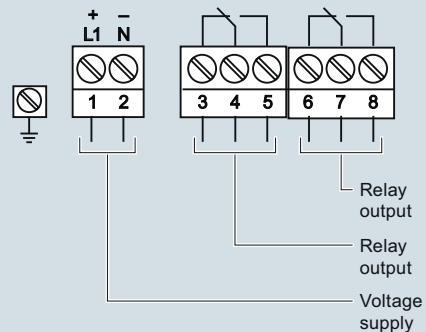
SITRANS LVL200 (Extended), dimensions in mm (inch)

Schematics

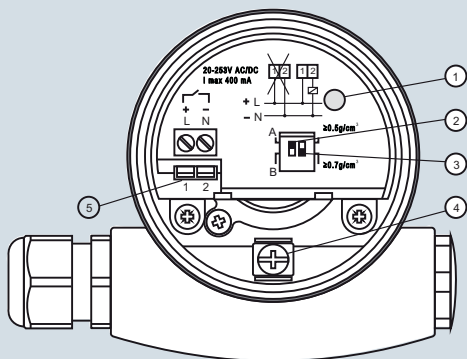
Relay (DPDT)



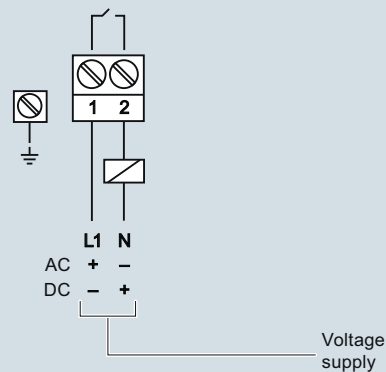
- ① Control lamp
- ② DIL switch for characteristics reversal
- ③ DIL switch for sensitivity adjustment
- ④ Ground terminal
- ⑥ Connection terminals



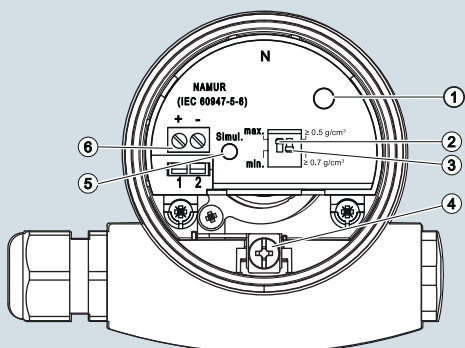
Contactless



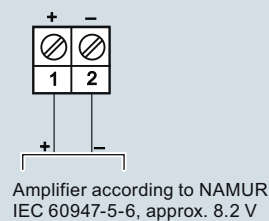
- ① Control lamp
- ② DIL switch for mode adjustment
- ③ DIL switch for switching point adaptation
- ④ Ground terminal
- ⑤ Connection terminals



NAMUR



- ① Control lamp
- ② DIL switch for characteristics reversal
- ③ DIL switch for sensitivity adjustment
- ④ Ground terminal
- ⑤ Simulation key
- ⑥ Connection terminals



SITRANS LVL200 connections

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS100

Overview



SITRANS LVS100 is a vibrating point level switch for material detection in bulk solids.

Benefits

- High resistance to mechanical forces
- Sliding sleeve options for adjustable insertion length and ease of cleaning
- Rotatable enclosure for ease of installation and wiring
- Suitable for point level detection of materials starting at a bulk density of 30 g/l (1.9 lb/ft³)
- Customer desired extensions up to 4 000 mm (157.48 inch)

Application

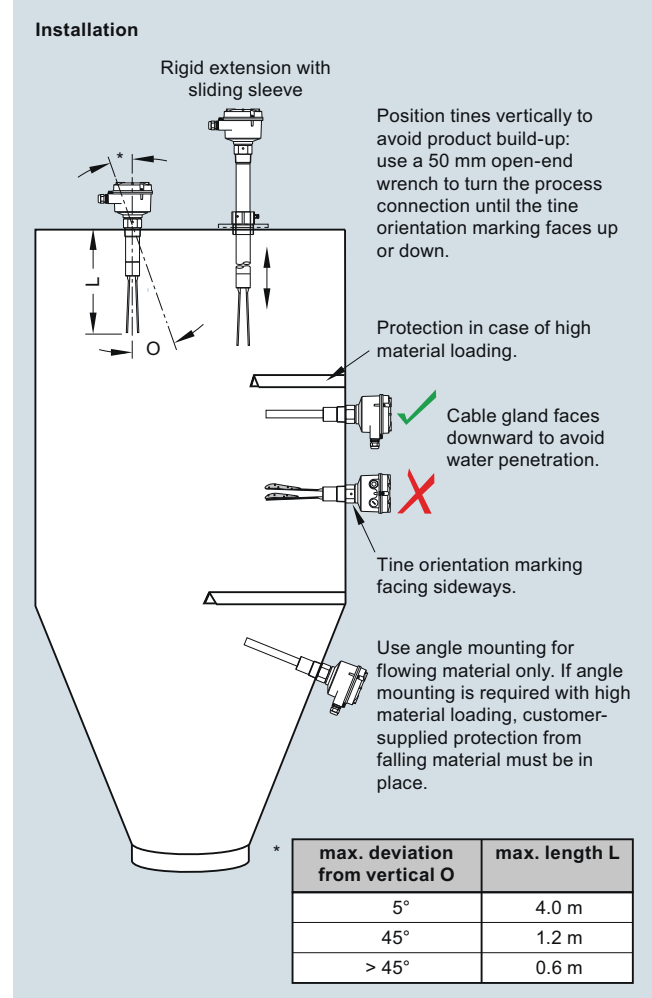
SITRANS LVS100 detects high, low or demand levels of dry bulk solids in bins, silos or hoppers.

SITRANS LVS100 has a compact design and can be top, side, or angle mounted. The vibrating fork design ensures the tines are kept clean. The unique design of the fork and crystal assembly eliminates false high level readings even if tines become damaged.

A signal from the electronic circuit excites a crystal in the probe causing the fork to vibrate. If the fork is covered by material, the change in vibration is detected by the electronic circuitry which causes the relay to change state after a one second delay. When the fork is free from material pressure, full vibration resumes and the relay reverts to its normal condition.

- Key Applications: dry bulk solids in bins, silos, hoppers

Configuration



SITRANS LVS100 installation, dimensions in mm (inch)

Technical specifications

Mode of Operation	
Measuring principle	Vibrating point level switch
Input	
Measured variable	High, low and demand
Measuring frequency	200 Hz
Output	
Relays	DPDT relay
Relay delay	From loss of vibration: approximately 1 second From resumption of vibration: approximately 1 ... 2 s
Signal delay	Probe uncovered to covered: approximately 1 s Probe covered to uncovered: approximately 1 ... 2 s
Relay fail-safe	High or low, switch selectable
Alarm output	Relay 8 A at 250 V AC, non-inductive Relay 5 A at 30 V DC, non-inductive
Sensitivity	
High or low, switch selectable	
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +60 °C (-40 ... +140 °F)
• Installation category	III
• Pollution degree	2
Medium conditions	
• Process temperature	-40 ... +150 °C (-40 ... +302 °F)
• Max. threaded bushing temperature	60 °C (140 °F)
• Max. enclosure surface temperature (Category 2D)	90 °C (194 °F)
• Max. extension surface temperature (Category 1D)	150 °C (302 °F)
• Pressure (vessel)	Max. 10 bar g (145 psi g) European Pressure Directive 97/23/EC: Category 1
Minimum material density	Approx. 30 g/l (1.9 lb/ft ³)

Design

Material	Epoxy coated aluminum
• Enclosure	<ul style="list-style-type: none"> Thread 1 ¼" NPT [(Taper), ANSI/ASME B1.20.1], R 1 ½" [(BSPT), EN 10226] Thread R 1 ½" [(BSPT), EN 10226], ½" NPT [(Taper), ANSI/ASME B1.20.1], sliding sleeve [min. length 500 mm (19.69 inch)] Thread material: stainless steel 304 (1.4301) or 316TI (1.4571) depending on configuration
Process connection	
Tine material	Stainless steel 316TI (1.4571)
Degree of protection	IP66/Type 4/NEMA 4
Conduit entry	2 x M20x1.5 or 2 x ½" NPT
Weight	Standard version, no extensions: approx. 1.7 kg (3.7 lb)
Power supply	
<ul style="list-style-type: none"> 19 ... 230 V AC, +10 %, 50 ... 60 Hz, 8 VA 19 ... 40 V DC, +10 %, 1.5 W 	

Certificates and approvals

- CSA/FM General Purpose
- CE
- CSA/FM Dust Ignition Proof
- RCM
- ATEX II 1/2 D
- IECex

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS100

Selection and Ordering data

SITRANS LVS100, standard

Vibrating point level switch for high or low level detection of bulk solids. Sensitivity > 30 g/l.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Input Voltage

DPDT Relay - 19 ... 230 V AC, 19 ... 40 V DC

DPDT Relay - 19 ... 230 V AC, 19 ... 40 V DC (stocked version)¹⁾

Process temperature

Up to 150 °C (302 °F)

Process connection

Threaded

R 1½" [(BSPT), EN 10226]

1¼" NPT [(Taper), ANSI/ASME B1.20.1]

R 1½" [(BSPT), EN 10226] DIN 2999 thread, sliding sleeve - min. length 500 mm (19.69 inch)²⁾

1½" NPT [(Taper), ANSI/ASME B1.20.1], sliding sleeve [min. length 500 mm (19.69 inch)]²⁾

Extension length

Stainless steel 316TI (1.4571)

Standard length, 170 mm (6.69 inch)

Add Order code Y01 and plain text:

"Insertion length ... mm"

Stainless steel 304 (1.4301)

• 300 ... 500 mm (11.81 ... 19.69 inch)

• 501 ... 1 000 mm (19.72 ... 39.37 inch)

• 1 001 ... 1 500 mm (39.41 ... 59.06 inch)

• 1 501 ... 2 000 mm (59.09 ... 78.74 inch)

• 2 001 ... 2 500 mm (78.78 ... 98.43 inch)

• 2 501 ... 3 000 mm (98.46 ... 118.11 inch)

• 3 001 ... 3 500 mm (118.15 ... 137.80 inch)

• 3 501 ... 4 000 mm (137.83 ... 157.48 inch)

Approvals

CSA/FM General Purpose, CE, RCM

CSA/FM Class II, Div. 1, Group E, F, G, Class III,

ATEX II 1/2 D, RCM

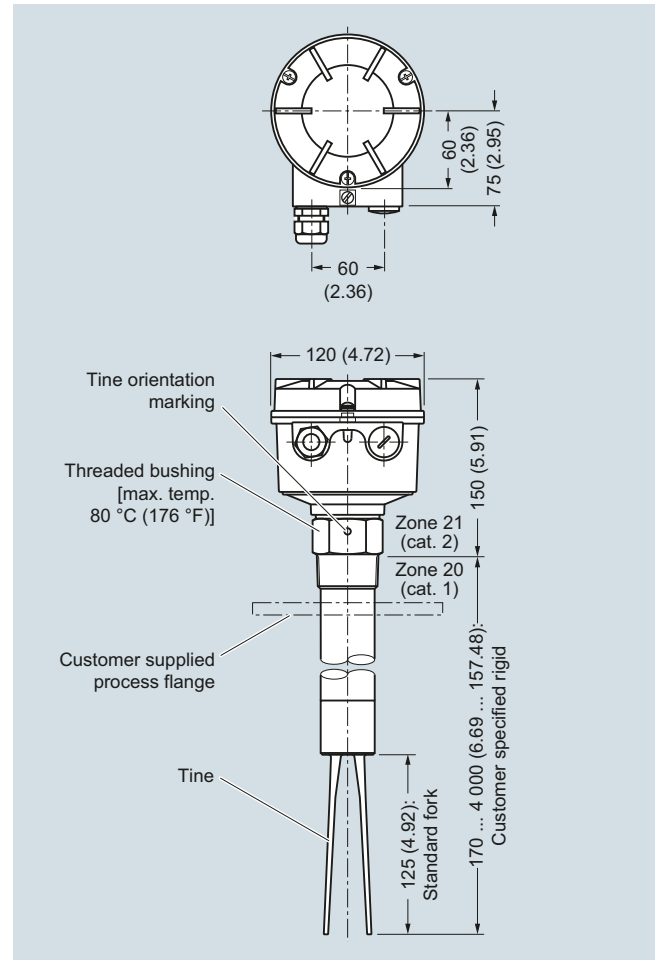
IEC-Ex t IIIC Da/Db

Article No.

7ML5735-

■ ■ ■ ■ ■ - 0 ■ A 0

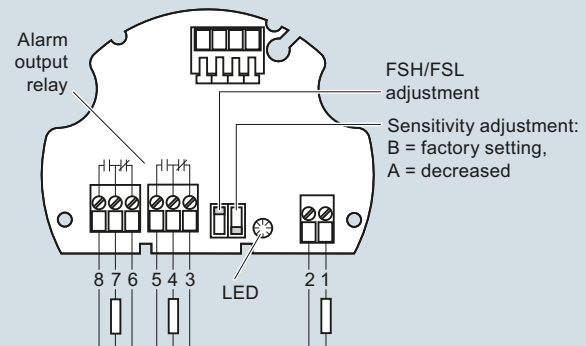
Dimensional drawings



SITRANS LVS100, dimensions in mm (inch)

Schematics

Universal voltage (DPDT relay)



AC: Terminal 1: L
Terminal 2: N
19 ... 230 V AC, +10 %, 50 ... 60 Hz, 8 VA

DC: Terminal 1: +
Terminal 2: -
19 ... 50 V DC, +10 %, 2 W

SITRANS LVS100 connections

¹⁾ Only available with the following configurations 7ML5735-2AA11-0AA0 or 7ML5735-2AB11-0AA0

²⁾ Not available with extension length options 11, 12

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data

Order code

Further Designs

Please add "-Z" to Article No. and specify Order code(s).

Total insertion length: Enter the total insertion length in plain text description, max. (50 mm increments)

Y01

Signal bulb inserted in M20 cable gland¹⁾

A20

Operating Instructions

Multi-language

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Article No.

7ML1998-5FT63

Spare Parts

Replacement Electronics Module LVS100 DPDT Relay (19 ... 253 V AC, 19 ... 55 V DC)

7ML1830-1NS

R 1½" [(BSPT), EN 10226] DIN 2999 thread, sliding sleeve

7ML1830-1NT

1½" NPT [(Taper), ANSI/ASME B1.20.1], sliding sleeve [min. length 500 mm (19.69 inch)]

7ML1830-1NU

¹⁾ Available only with approval CE

Overview

SITRANS LVS200 is a vibrating point level switch for high, low, or demand level detection of bulk solids.

Benefits

- High resistance to mechanical forces
- Strong vibration resistance to high bulk material loads
- Rotatable enclosure for convenient wiring
- Suitable for low density material: standard version, 20 g/l (1.3 lb/ft³); liquid/solid interface version, 50 g/l (3 lb/ft³) and low density option min. 5 g/l (0.3 lb/ft³)
- Customer desired extensions up to 20 000 mm (787 inch)
- Optional detection of solids within liquid
- Durable short fork option with 165 mm (6.5 inch) insertion length

Application

The standard LVS200 detects high, low, or demand levels of dry bulk solids in bins, silos, or hoppers. The liquid/solid interface version can also detect settled solids within liquids or solids within confined spaces such as feed pipes. It is designed to ignore liquids in order to detect the interface between a solid and a liquid.

A pipe extension version is available with either the standard or liquid/solid interface electronics and fork, separated by a customer supplied 1 inch pipe.

SITRANS LVS200 has an optional 4 ... 20 mA output for monitoring buildup on the fork to determine when preventative maintenance should be performed in sticky applications.

The LVS200 has a compact design and can be top, side or angle mounted. The vibrating fork design ensures the tines are kept clean. The unique design of the fork and crystal assembly eliminates false high level readings even if tines become damaged.

A signal from the electronic circuit excites a crystal in the probe causing the fork to vibrate. If the fork is covered by material, the change in vibration is detected by the electronic circuitry which causes the relay to change state after a one second delay.

When the fork is free from material pressure, full vibration resumes and the relay reverts to its normal condition.

- Key Applications: dry bulk solids in bins, silos, hoppers or settled solids within liquids (interface version)

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Technical specifications

Mode of operation		Medium conditions	
Measuring principle	Vibrating point level switch	<ul style="list-style-type: none"> Process temperature 	<ul style="list-style-type: none"> All except CSA Class II, Group G: -40 ... +150 °C (-40 ... +302 °F) CSA Class II, Group G: -40 ... +140 °C (-40 ... +284 °F), CSA temperature code T3B
Input		<ul style="list-style-type: none"> Max. threaded bushing temperature Max. enclosure surface temperature (Category 2D) Max. extension surface temperature (Category 1D) Pressure (vessel) 	<ul style="list-style-type: none"> 60 °C (140 °F) 90 °C (194 °F) 150 °C (302 °F)
Measured variable	High, low and demand	<ul style="list-style-type: none"> Minimum material density 	<ul style="list-style-type: none"> Max. 10 bar g (145 psi g) European Pressure Directive 97/23/EC: Category 1 Standard version: approx. 20 g/l (1.2 lb/ft³) Liquid/solid interface version: approx. 50 g/l (3 lb/ft³) Optional low density version: approx. 5 g/l (0.3 lb/ft³)
Measuring frequency	125 Hz	Design	
<ul style="list-style-type: none"> Standard Liquid/solid interface and short fork version 	350 Hz	Material	Epoxy coated aluminum
Output		Process connection	<ul style="list-style-type: none"> Thread 1½" NPT [(Taper), ANSI/ASME B1.20.1], R ½" [(BSPT), EN 10226] and flange options Optional sliding bushing with 2" NPT [(Taper), ANSI/ASME B1.20.1] or BSP thread Thread material: stainless steel 303 (1.4301)
PNP	Open collector: Permanent load max. 0.4 A, short-circuit and overload protected Turn-on voltage: max. 50 V (reverse protection)	Tine material	Stainless steel 316Ti (1.4571), PTFE-coated tines are available upon special request
2-wire without contact	Load current: <ul style="list-style-type: none"> Min. 10 mA Max. 500 mA permanent Max. 2A < 200 ms Max. 5A < 50 ms Voltage drop on the electronic module: max. 7 V with closed electric circuit Cutoff current with open electric circuit: max. 5 mA	Degree of protection	IP65/Type 4/NEMA 4
Relays	SPDT relay DPDT relay	Conduit entry	2 x M20x1.5 or 2 x ½" NPT
<ul style="list-style-type: none"> Version with 1 relay Version with 2 relays 	<ul style="list-style-type: none"> From loss of vibration: approximately 1 second From resumption of vibration: approximately 1 ... 2 seconds 	Weight	<ul style="list-style-type: none"> Standard version, no extensions: approx. 2.0 kg (4.4 lb) Solids/liquids version, no extensions: approx. 1.9 kg (4.2 lb)
Relay delay	<ul style="list-style-type: none"> Probe uncovered to covered: approximately 1 second Probe covered to uncovered: approximately 1 ... 2 seconds 	Power supply	
Signal delay	High or low, switch selectable	<ul style="list-style-type: none"> 19 ... 230 V AC, +10 %, 50 ... 60 Hz, 8 VA 19 ... 55 V DC, +10 %, 1.5 W 	
Relay fail-safe	<ul style="list-style-type: none"> Relay 8 A at 250 V AC, non-inductive Relay 5 A at 30 V DC, non-inductive 	Certificates and approvals	
Alarm output	8/16 mA or 4 ... 20 mA	<ul style="list-style-type: none"> CSA/FM General Purpose CE CSA/FM Dust Ignition Proof RCM ATEX II 1/2 D CSA/FM IS Class I, II, III Div. 1, Groups A, B, C, D, E, F, G, FM Class 1, Aex ia IIC, CSA Class 1, Ex ia IIC, available only with power supply option 5 and 6 ATEX II 1G and 1/2 G Eex ia IIC; ATEX II 1D and 1/2 D, available only with power supply option 5 	
mA output	4 ... 20 mA ± 0.1 mA		
<ul style="list-style-type: none"> Resolution 	High or low, switch selectable		
Sensitivity			
Rated operating conditions			
Installation conditions	Indoor/outdoor		
<ul style="list-style-type: none"> Location 			
Ambient conditions	-40 ... +60 °C (-40 ... +140 °F)		
<ul style="list-style-type: none"> Ambient temperature Installation category Pollution degree 	III 2		

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Selection and Ordering data	Article No.
SITRANS LVS200, standard SITRANS LVS200 is a vibrating point level switch for high, low, or demand level detection of bulk solids.	7ML5731- A 0
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Power supply	
19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT) ¹⁾	1
19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT) ¹⁾	2
18 ... 50 V DC PNP ¹⁾	3
19 ... 230 V AC/DC without contact, 2-wire loop powered ¹⁾	4
7 ... 9 V DC (requires NAMUR switch amplifier) NAMUR IEC 60947-5-6, 2-wire ²⁾	5
8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire ³⁾	6
19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT) basic version ⁴⁾⁵⁾	7
Process temperature	
Without temperature isolator	A
With temperature isolator	B
Separated enclosure - cable length 1.5 m (4.92 ft) [max. temperature process 150 °C (302 °F)/ max. temperature electronics 60 °C (140 °F)]	C
Separated enclosure - cable length 4.0 m (13.12 ft) [max. temperature process 150 °C (302 °F)/ max. temperature electronics 60 °C (140 °F)]	D
Process connection	
Threaded	
R 1½" [(BSPT), EN 10226]	A
1½" NPT [(Taper), ANSI/ASME B1.20.1]	B
G 2" [(BSPP), EN ISO 228-1], sliding sleeve [min. length 500 mm (19.69 inch)] ⁶⁾	C
2" NPT [(Taper), ANSI/ASME B1.20.1], sliding sleeve [min. length 500 mm (19.69 inch)] ⁶⁾	D
Flanged	
DN 100 PN 6, EN 1092-1 ⁷⁾	E
DN 100 PN 16, EN 1092-1	F
2" ASME 150 lb B16.5	G
3" ASME 150 lb B16.5	H
4" ASME 150 lb B16.5	J
2" Tri-clamp (DN 50) ISO 2852	K
Extension length	
Stainless steel 304 (1.4301)	
Standard length, 235 mm (9.25 inch)	11
Add Order code Y01 and plain text: "Insertion length ... mm"	
• 300 ... 500 mm (11.81 ... 19.69 inch)	12
• 501 ... 750 mm (19.72 ... 29.53 inch)	13
• 751 ... 1 000 mm (29.57 ... 39.37 inch)	14
• 1 001 ... 1 250 mm (39.41 ... 49.21 inch)	15
• 1 251 ... 1 500 mm (49.25 ... 59.06 inch)	16
• 1 501 ... 1 750 mm (59.09 ... 68.90 inch)	17
• 1 751 ... 2 000 mm (68.94 ... 78.74 inch)	18
• 2 001 ... 2 250 mm (78.78 ... 88.58 inch)	21
• 2 251 ... 2 500 mm (88.62 ... 98.43 inch)	22
• 2 501 ... 2 750 mm (98.46 ... 108.27 inch)	23
• 2 751 ... 3 000 mm (108.31 ... 118.11 inch)	24
• 3 001 ... 3 250 mm (118.15 ... 127.95 inch)	25
• 3 251 ... 3 500 mm (127.99 ... 137.80 inch)	26
• 3 501 ... 3 750 mm (137.83 ... 147.64 inch)	27
• 3 751 ... 4 000 mm (147.68 ... 157.48 inch)	28

Selection and Ordering data	Article No.
SITRANS LVS200, standard SITRANS LVS200 is a vibrating point level switch for high, low, or demand level detection of bulk solids.	7ML5731- A 0
Stainless steel 316L (1.4404)	
Standard length, 235 mm (9.25 inch)	31
Add Order code Y01 and plain text: "Insertion length ... mm"	
300 ... 500 mm (11.81 ... 19.69 inch)	32
501 ... 750 mm (19.72 ... 29.53 inch)	33
751 ... 1 000 mm (29.57 ... 39.37 inch)	34
1 001 ... 1 250 mm (39.41 ... 49.21 inch)	35
1 251 ... 1 500 mm (49.25 ... 59.06 inch)	36
1 501 ... 1 750 mm (59.09 ... 68.90 inch)	37
1 751 ... 2 000 mm (68.94 ... 78.74 inch)	38
2 001 ... 2 250 mm (78.78 ... 88.58 inch)	41
2 251 ... 2 500 mm (88.62 ... 98.43 inch)	42
2 501 ... 2 750 mm (98.46 ... 108.27 inch)	43
2 751 ... 3 000 mm (108.31 ... 118.11 inch)	44
3 001 ... 3 250 mm (118.15 ... 127.95 inch)	45
3 251 ... 3 500 mm (127.99 ... 137.80 inch)	46
3 501 ... 3 750 mm (137.83 ... 147.64 inch)	47
3 751 ... 4 000 mm (147.68 ... 157.48 inch)	48
Material process connection/extension	
Stainless steel threads 304 (1.4301), flanges 321 (1.4541), Tri-clamp 304 (1.4301) ⁸⁾	1
Stainless steel 316L (1.4404) ⁹⁾	2
Approvals	
CSA/FM Dust Ignition Proof, RCM	A
ATEX II 1/2 D, RCM	B
CSA/FM General Purpose, RCM	C
CE, RCM	D
CSA/FM IS Class I, II, III Div. 1, Groups A, B, C, D, E, F, G, FM Class 1, Aex ia IIC, CSA Class 1, Ex ia IIC, RCM	E
ATEX II 1G and 1/2G Eex ia IIC; ATEX II 1D and 1/2D, RCM	F
IEC-Ex t IIIC Da/Db	G

¹⁾ Available with Approval options A ... D, G only

²⁾ Available with Approval options D, E, F only

³⁾ Available with Approval options B, D, G only

⁴⁾ Available with configurations 7ML5731-7AA11-1BA0 or 7ML5731-7AB11-1AA0 only

⁵⁾ Basic version is cost effective and offers fast delivery

⁶⁾ Not available with extension length options 11, 12, 31, 32

⁷⁾ Max. 6 bar (87 psi)

⁸⁾ Available with option extension length 11 ... 28

⁹⁾ Available with option extension length 31 ... 48

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

▶ Available ex stock. For details see page 9/5 in the appendix.

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Selection and Ordering data

Order code

Further Designs

Please add **"-Z"** to Article No. and specify Order code(s).

Total insertion length: Enter the total insertion length in plain text description, max. 4 000 mm (157.48 inch)

Y01

Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text

Y14

Enhanced sensitivity > 5 g/l via electronics and increased fork length to 195 mm (7.68 inch)³⁾

K05

Enhanced sensitivity < 5 g/l via electronics, increased fork length to 195 mm (7.68 inch), and increased aluminum fork width¹⁾³⁾

G01

Signal bulb inserted in M20 cable gland²⁾

A20

NAMUR 8/16 mA switch amplifiers available, contact factory for pricing

Operating Instructions

Multi-language

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Article No.

7ML1998-5FT63

Spare Parts

Replacement Electronics Module (125 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)]

7ML1830-1KL

Sliding sleeve, 2" BSP (ISO 228)

7ML1830-1JM

Sliding sleeve, 2" NPT (ASME B1.20.1)

7ML1830-1JN

Namur Isolator switch amplifier relay output KFD2-SR2-Ex1.W

A5E03496569

Available ex stock

For details see page 9/5 in the appendix.

SITRANS LVS200, standard, power supply 7, process temperature A, process connection A, extension length 11, material process connection/extension 1, and approval B

7ML5731-7AA11-1BA0

SITRANS LVS200, standard, power supply 7, process temperature A, process connection B, extension length 11, material process connection/extension 1, and approval A

7ML5731-7AB11-1AA0

¹⁾ Available only with power supply 1 and Approval C, D and with Process connection flange E ... J

²⁾ Available with Approval option D only

³⁾ K05 and G01 are not available together

Selection and Ordering data

Article No.

SITRANS LVS200, short fork for liquids/solids interface

7ML5732-

Vibrating point level switch for solids or solids within liquid interface applications, and high load applications with short insertion requirements



Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Power supply

19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)

1

19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT)

2

18 ... 50 V DC PNP

3

19 ... 230 V AC/DC without contact, 2-wire loop powered

4

8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire¹⁾

5

Process temperature

Without temperature isolator

A

With temperature isolator

B

Separated enclosure - cable length 1.5 m (4.92 ft) [max. temperature process 150 °C (302 °F)/max. temperature electronics 60 °C (140 °F)]

C

Separated enclosure - cable length 4.0 m (13.12 ft) [max. temperature process 150 °C (302 °F)/max. temperature electronics 60 °C (140 °F)]

D

Process connection

Threaded

R 1½" [(BSPT), EN 10226]

A

1½" NPT [(Taper), ANSI/ASME B1.20.1]

B

G 2" [(BSPP), EN ISO 228-1], sliding sleeve

C

[min. length 500 mm (19.69 inch)]²⁾

2" NPT [(Taper), ANSI/ASME B1.20.1],

sliding sleeve [min. length 500 mm (19.69 inch)]²⁾

D

Flanged

DN 100 PN 6, EN 1092-1³⁾

E

DN 100 PN 16, EN 1092-1

F

2" ASME 150 lb B16.5

G

3" ASME 150 lb B16.5

H

4" ASME 150 lb B16.5

J

2" Tri-clamp (DN 50) ISO 2852

K

Extension length

Stainless steel 304 (1.4301)

Standard length, 165 mm (6.50 inch)

11

Add Order code Y01 and plain text: "Insertion length ... mm"

200 ... 500 mm (7.87 ... 19.69 inch)

12

501 ... 750 mm (19.72 ... 29.53 inch)

13

751 ... 1 000 mm (29.57 ... 39.37 inch)

14

1 001 ... 1 250 mm (39.41 ... 49.21 inch)

15

1 251 ... 1 500 mm (49.25 ... 59.06 inch)

16

1 501 ... 1 750 mm (59.09 ... 68.90 inch)

17

1 751 ... 2 000 mm (68.94 ... 78.74 inch)

18

2 001 ... 2 250 mm (78.78 ... 88.58 inch)

21

2 251 ... 2 500 mm (88.62 ... 98.43 inch)

22

2 501 ... 2 750 mm (98.46 ... 108.27 inch)

23

2 751 ... 3 000 mm (108.31 ... 118.11 inch)

24

3 001 ... 3 250 mm (118.15 ... 127.95 inch)

25

3 251 ... 3 500 mm (127.99 ... 137.80 inch)

26

3 501 ... 3 750 mm (137.83 ... 147.64 inch)

27


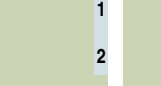
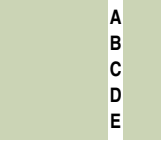


3 751 ... 4 000 mm (147.68 ... 157.48 inch)

28

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LVS200, short fork for liquids/solids interface Vibrating point level switch for solids or liquids within liquid interface applications, and high load applications with short insertion requirements <u>Stainless steel 316L (1.4404)</u> Standard length, 165 mm (6.50 inch) <u>Add Order code Y01 and plain text: "Insertion length ... mm"</u> 200 ... 500 mm (7.87 ... 19.69 inch) 501 ... 750 mm (19.72 ... 29.53 inch) 751 ... 1 000 mm (29.57 ... 39.37 inch) 1 001 ... 1 250 mm (39.41 ... 49.21 inch) 1 251 ... 1 500 mm (49.25 ... 59.06 inch) 1 501 ... 1 750 mm (59.09 ... 68.90 inch) 1 751 ... 2 000 mm (68.94 ... 78.74 inch) 2 001 ... 2 250 mm (78.78 ... 88.58 inch) 2 251 ... 2 500 mm (88.62 ... 98.43 inch) 2 501 ... 2 750 mm (98.46 ... 108.27 inch) 2 751 ... 3 000 mm (108.31 ... 118.11 inch) 3 001 ... 3 250 mm (118.15 ... 127.95 inch) 3 251 ... 3 500 mm (127.99 ... 137.80 inch) 3 501 ... 3 750 mm (137.83 ... 147.64 inch) 3 751 ... 4 000 mm (147.68 ... 157.48 inch)	7ML5732-  A 0	Further Designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: Enter the total insertion length in plain text description, max. 4 000 mm (147.48 inch) Y01 Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]; Measuring-point number/identification (max. 27 characters); specify in plain text Y14 Signal bulb inserted in M20 cable gland ¹⁾ A20 Adjustable sensitivity (by potentiometer) for solids/liquids interface detection ¹⁾²⁾ G02	
Material process connection/extension Stainless steel threads 304 (1.4301), flanges 321(1.4541), Tri-clamp 304 (1.4301) ⁴⁾ Stainless steel 316L (1.4404) ⁵⁾	 1 2	Operating Instructions Multi-language This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5FT63
Approvals CSA/FM Dust Ignition Proof, RCM ATEX II 1/2 D, RCM CSA/FM General Purpose, RCM CE, RCM IEC-Ex t IIIC Da/Db	 A B C D E	Spare Parts Replacement Electronics Module (350 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)] 7ML1830-1KM Sliding sleeve, 2" BSP (ISO 228) 7ML1830-1JM Sliding sleeve, 2" NPT (ASME B1.20.1) 7ML1830-1JN	
¹⁾ Available with Approval option B, D, E only ²⁾ Not available with extension length options 11,12, 31, 32 ³⁾ Max. 6 bar (87psi) ⁴⁾ Available with option extension length 11 ... 28 ⁵⁾ Available with option extension length 31 ... 48		¹⁾ Available with Approval option D only ²⁾ Available with power supply option 1 only	
 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.			

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Selection and Ordering data	Article No.
SITRANS LVS200, pipe extension Vibrating point level switch for high or low levels of bulk solids Extended using 1" pipe extension (customer supplied) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5733-
Power supply 19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT) ¹⁾ 19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT) ¹⁾ 18 ... 50 V DC PNP ¹⁾ 19 ... 230 V AC/DC without contact, 2-wire loop powered ¹⁾ 7 ... 9 V DC (requires NAMUR switch amplifier) NAMUR IEC 60947-5-6, 2-wire ²⁾ 8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire ³⁾	1 2 3 4 5 6
Process temperature Up to 150 °C (302 °F)	A
Process connection <u>Threaded</u> R 1½" [(BSPT), EN 10226] 1½" NPT [(Taper), ANSI/ASME B1.20.1] <u>Flanged</u> DN 100 PN 6, EN 1092-1 ⁴⁾ DN 100 PN 16, EN 1092-1 2" ASME 150 lb B16.5 3" ASME 150 lb B16.5 4" ASME 150 lb B16.5 2" Tri-clamp (DN 50) ISO 2852	A B C D E F G K
Process connection material Stainless steel threads 304 (1.4301), flanges 321 (1.4541), Tri-clamp 304 (1.4301) Stainless steel 316L (1.4404)	1 2
Extension length Customer supplied 1" pipe extension Length: 300 ... 3 800 mm (11.81 ... 149.61 inch)	1
Application type Dry bulk solids (125 Hz) Liquids/solids interface (350 Hz)	1 2
Approvals CSA/FM Dust Ignition Proof, RCM ATEX II 1/2 D, RCM CSA/FM General Purpose, RCM CE, RCM CSA/FM IS Class I, II, III Div. 1, Groups A, B, C, D, E, F, G, FM Class 1, Aex ia IIC, CSA Class 1, Ex ia IIC, RCM ATEX II 1G and 1/2G Eex ia IIC; ATEX II 1D and 1/2D, RCM IEC-Ex t IIIC Da/Db	A B C D E F H

- 1) Available with Approval options A, B, C, D, G only
- 2) Available with Approval options D, E and F only.
Not available for application type 2 "Liquids/solids interface".
- 3) Available with Approval options B, D, G only
- 4) Max. 6 bar (87 psi)



Selection and Ordering data	Order code
Further Designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: Enter the total insertion length in plain text description, max. 3 800 mm (149.61 inch) Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]; Measuring-point number/identification (max. 27 characters); specify in plain text Enhanced sensitivity > 5 g/l via electronics and increased fork length to 195 mm (7.68 inch) ⁵⁾ Enhanced sensitivity < 5 g/l via electronics, increased fork length to 195 mm (7.68 inch) and increased aluminum fork width ¹⁾⁴⁾⁵⁾ Adjustable sensitivity (by potentiometer) for solids/liquids interface detection ²⁾³⁾⁴⁾ Signal bulb inserted in M20 cable gland ²⁾	 Y01 Y14 K05 G01 G02 A20
Operating Instructions Multi-language This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5FT63
Spare Parts Replacement Electronics Module (125 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)] Replacement Electronics Module (350 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)] Isolated switch amplifier relay output KFD2-SR2-Ex1.W	7ML1830-1KL 7ML1830-1KM A5E03496569


- 1) Available only with power supply 1 and Approvals C, D and with Process connection flange C ... G
- 2) Available with approval options D only
- 3) Available with power supply option 1 only and application type 2
- 4) Not available with option K05
- 5) Available with Application type 1 only

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Selection and Ordering data	Article No.
SITRANS LVS200, cable extended Vibrating point level switch for high or low level detection of bulk solids materials 	7ML5734-
 Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Power supply 19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT) ¹⁾ 19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT) ¹⁾ 18 ... 50 V DC PNP ¹⁾ 19 ... 230 V AC/DC without contact, 2-wire loop powered ¹⁾ 7 ... 9 V DC (requires NAMUR switch amplifier) NAMUR IEC 60947-5-6, 2-wire ²⁾ 8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire ³⁾	1 2 3 4 5 6
Process temperature Up to 80 °C (176 °F)	A
Process connection Threaded R 1½" [(BSPT), EN 10226] (1.4301/304) 1½" NPT [(Taper), ANSI/ASME B1.20.1] (1.4301/304) Flanged DN 100 PN 6, EN 1092-1 (1.4541/321) ⁴⁾ DN 100 PN 16, EN 1092-1 (1.4541/321) 2" ASME 150 lb B16.5 (1.4541/321) 3" ASME 150 lb B16.5 (1.4541/321) 4" ASME 150 lb B16.5 (1.4541/321)	A B C D E F G
Extension length 750 ... 1 000 mm (29.5 ... 39.4 inch) [max. length 20 000 mm (787.4 inch), not with Power supply option 5 (max. 10 000 mm, 393.7 inch)] Add Order code Y01 and plain text: "Insertion length ... mm" 1 001 ... 2 000 mm (39.41 ... 78.74 inch) 2 001 ... 3 000 mm (78.78 ... 118.11 inch) 3 001 ... 4 000 mm (118.15 ... 157.48 inch) 4 001 ... 5 000 mm (157.52 ... 196.85 inch) 5 001 ... 6 000 mm (196.89 ... 236.22 inch) 6 001 ... 7 000 mm (236.26 ... 275.59 inch) 7 001 ... 8 000 mm (275.63 ... 314.96 inch) ⁵⁾ 8 001 ... 9 000 mm (315 ... 354.33 inch) ⁵⁾ 9 001 ... 10 000 mm (354.37 ... 393.70 inch) ⁵⁾ 10 001 ... 11 000 mm (393.74 ... 433.07 inch) ⁵⁾⁶⁾ 11 001 ... 12 000 mm (433.11 ... 472.44 inch) ⁵⁾⁶⁾ 12 001 ... 13 000 mm (472.48 ... 511.81 inch) ⁵⁾⁶⁾ 13 001 ... 14 000 mm (511.85 ... 551.18 inch) ⁵⁾⁶⁾ 14 001 ... 15 000 mm (551.22 ... 590.55 inch) ⁵⁾⁶⁾ 15 001 ... 16 000 mm (590.59 ... 629.92 inch) ⁵⁾⁶⁾ 16 001 ... 17 000 mm (629.96 ... 669.29 inch) ⁵⁾⁶⁾ 17 001 ... 18 000 mm (669.33 ... 708.66 inch) ⁵⁾⁶⁾ 18 001 ... 19 000 mm (708.70 ... 748.03 inch) ⁵⁾⁶⁾ 19 001 ... 20 000 mm (748.07 ... 787.40 inch) ⁵⁾⁶⁾	10 11 12 13 14 15 16 17 18 20 21 22 23 24 25 26 27 28 30 31
Application type Dry bulk solids (125 Hz) Liquid/solids interface (350 Hz) ⁷⁾	1 2

Selection and Ordering data	Article No.
SITRANS LVS200, cable extended Vibrating point level switch for high or low level detection of bulk solids materials 	7ML5734-
Approvals CSA/FM Dust Ignition Proof, RCM ATEX II 1/2 D, RCM CSA/FM General Purpose, RCM CE, RCM CSA/FM IS Class I, II, III Div. 1, Groups A, B, C, D, E, F, G, FM Class 1, Aex ia IIC, CSA Class 1, Ex ia IIC, RCM ATEX II 1G and 1/2G Eex ia IIC; ATEX II 1D and 1/2D, RCM ⁶⁾ IEC-Ex t IIIC Da/Db	A B C D E F G
¹⁾ Available with Approval options A, B, C, D, G only ²⁾ Available with Approval option D, E and F only. Not available for application type 2 "Liquids/solids interface". ³⁾ Available with Approval option D only ⁴⁾ Max. 6 bar (87 psi) ⁵⁾ Not available with application type option 2 ⁶⁾ Not available with Power supply option 5 ⁷⁾ Cable length is limited to 7 000 mm (275.59 inch).	

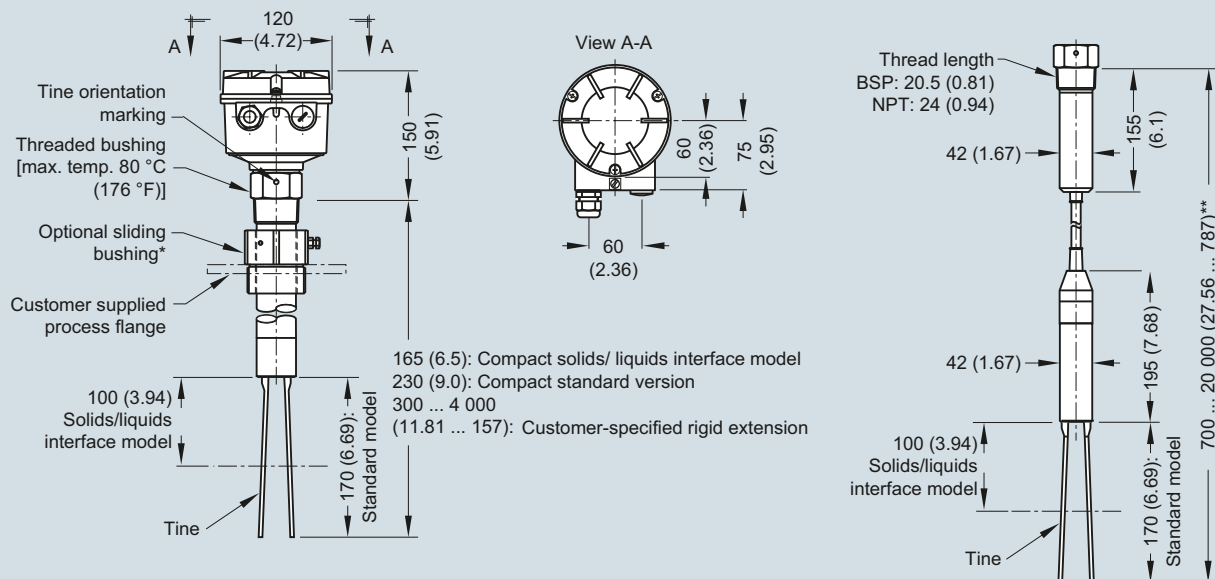
Selection and Ordering data	Order code
Further Designs Please add "-Z" to Article No. and specify Order code(s). Enter the total insertion length in plain text description, max. 20 000 mm (787.40 inch) Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]; Measuring-point number/identification (max. 27 characters); specify in plain text Enhanced sensitivity > 5 g/l via electronics and increased fork length to 195 mm (7.68 inch) Enhanced sensitivity < 5 g/l via electronics and increased fork length to 195 mm (7.68 inch) and increased aluminum fork width ¹⁾ Signal bulb inserted in M20 cable gland ²⁾	Y01 Y14 K05 G01 A20
Operating Instructions Multi-language This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5FT63
Spare Parts Replacement Electronics Module (125 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)] Replacement Electronics Module (350 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)] Isolated switch amplifier relay output KFD2-SR2-Ex1.W	7ML1830-1KL 7ML1830-1KM A5E03496569
¹⁾ Available only with power supply 1 and Approvals C, D and with process connection flange C ... G ²⁾ Available with Approval options C and D only	

Level Measurement

Point level measurement – Vibrating switches

SITRANS LVS200

Dimensional drawings



Notes:

* The clamping screws of the sliding bushing must be tightened to 10 Nm.

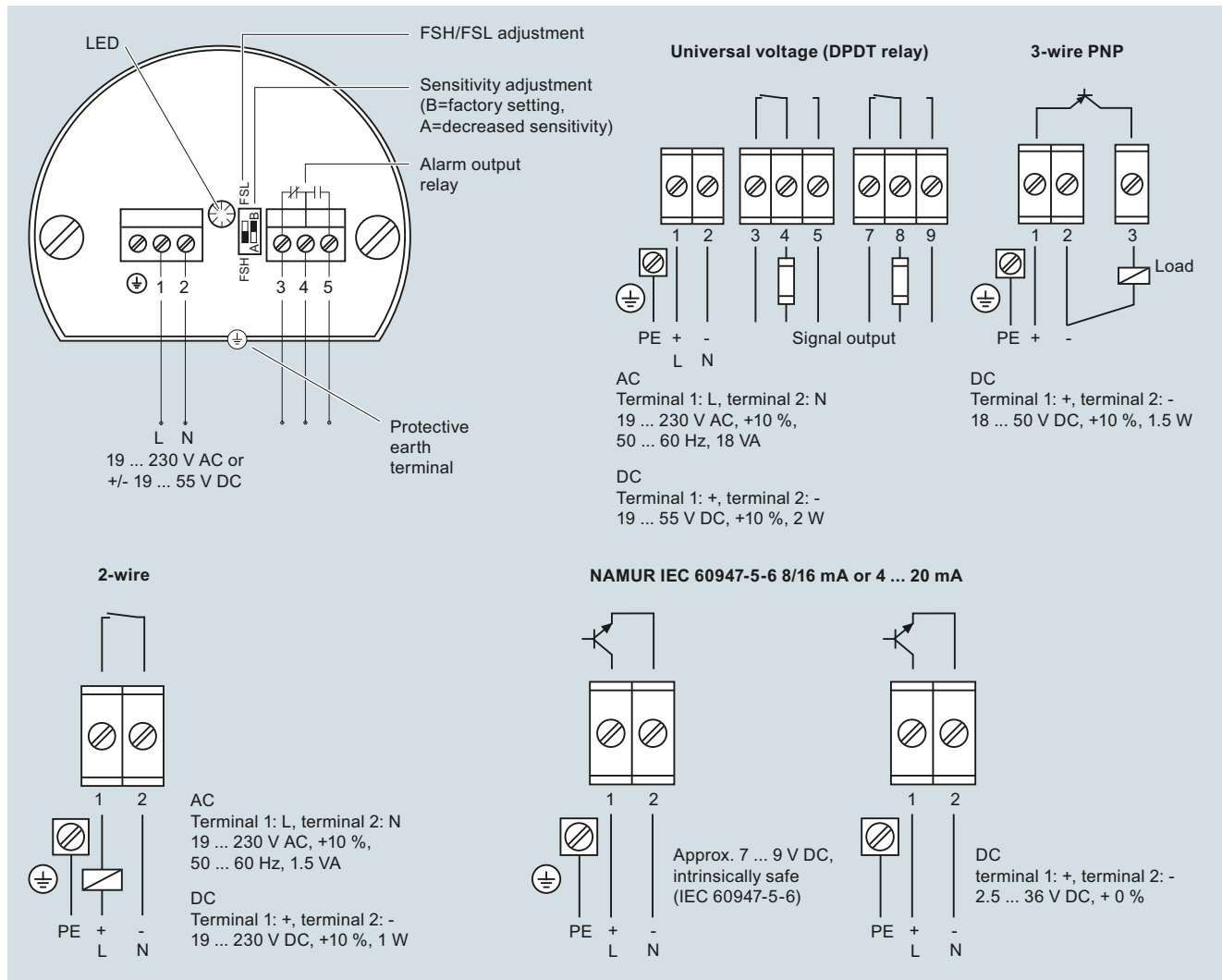
** Cable version with liquids/solids interface model option length to 7 000 mm (275.59 inch)

Cable version with NAMUR electronics length to 10 000 mm (393.7 inch) tightened to 10 Nm.

See drawing 23650563 for pipe extended version details. (Pipe is customer supplied.)

SITRANS LVS200, dimensions in mm (inch)

Schematics



SITRANS LVS200 connections

Level Measurement

Point level measurement – Rotation paddle switches

SITRANS LPS200

Overview



SITRANS LPS200 is a rotary paddle switch for point level and material detection in bulk solids.

Benefits

- Proven paddle switch technology for bulk solids
- High integrity mechanical seal
- Optional switch selectable power supply
- Unique friction clutch mechanism prevents damage from falling material
- Rotatable enclosure for convenient wiring
- Optional paddles for use with low density materials
- Small paddle makes for simple installation through existing process connection
- High temperature model and optional extension kit available
- Optional fail-safe configuration detects loss of rotation

Application

The paddle switch technology detects full, empty, or demand conditions on materials such as grain, feed, cement, plastic granulate, and wood chips. The paddle switch can handle bulk densities as low as 15 g/l (2,19 lb/ft³) with the optional rectangular vane or 100 g/l (6.25 lb/ft³) with the standard measuring vane.

A low revolution geared motor with slip clutch drives a rotating measuring vane which senses the presence of material at the mounted level of the LPS200. As material comes into contact with the rotating paddle, rotation stops, which changes the microswitch state. When the paddle is no longer covered by material, rotation resumes and the relay reverts to its normal condition.

The LPS200 has a rugged design for use in harsh conditions in the solids industry. The sensitivity of the paddle can be adjusted for varying material properties like buildup on the vane.

The LPS200 comes in a variety of configurations including compact, extended and cable extension. It is equipped with a standard vane which is effective in most applications, but can be configured with a hinged or rectangular vane for increased sensitivity for light materials.

- Key Applications: bulk solids such as grain, feed, cement, plastic granulate, wood chips

Technical specifications

Mode of operation	
Measuring principle	Rotating point level switch
Input	
Measured variable	High and low and demand
Output	
Output signal	Microswitch 5 A at 250 V AC, non inductive Microswitch SPDT contact 4 A at 30 V DC, non-inductive
• Alarm output	
• Pickup delay	Standard (1 rpm model): approx. 1.3 seconds Optional process applications (5 rpm model): approx. 0.26 seconds
Sensitivity	
Adjustable via reset force of spring or geometry of measuring vane	
Rated operating conditions	
Installation conditions	Indoor/outdoor
• Location	
Ambient conditions	
• Ambient temperature	-25 ... +60 °C (-13 ... +140 °F)
• Installation category	
• Pollution degree	2
Medium conditions	Bulk solids
• Temperature	-25 ... +80 °C (-13 ... +176 °F)
- Standard	
- Optional	-25 ... +600°C (-13 ... +1 112 °F)
• Pressure (vessel)	Max. 0.5 bar g (7.25 psi g) Max. 10 bar g (145 psi g)
- Standard	
- Optional	
• Minimum material density	• Can detect down to 100 g/l (6.25 lb/ft ³) • Can detect down to 15 g/l (2.19 lb/ft ³)
- Standard measuring vane	
- Optional measuring vane	
Design	
Material	Epoxy coated aluminum Stainless steel or aluminum
• Enclosure	
• Process connection, measuring shaft and vane	
Process connection	Thread NPT, BSP, and flange options
Degree of protection	IP65/Type 4/NEMA 4
Conduit entry	2 x M20x1.5 or 2 x ½" NPT
Power supply	
• Jumper selectable	• 115 V AC, ± 15 %, 50 ... 60 Hz, 4 VA or 230 V AC, ± 15 %, 50 Hz, 6 VA, or 48 V AC, or 24 V AC or 24 V DC, ± 15 %, 2.5 W
• Universal voltage (DPDT replay)	
	24 V DC ± 15 % 50 ... 60 Hz, 22...230 V, ± 10 %, max. 10 VA
Certificates and approvals	
• CSA/FM General Purpose	
• CE	
• CSA/FM Dust Ignition Proof	
• ATEX II 1/2 D	
• RCM	
• IECex	

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS LPS200, compact Rotary paddle switch for level and material detection in bulk solids. Compact design for side or top mounted applications.	7ML5725-	- - - - 0	SITRANS LPS200, compact Rotary paddle switch for level and material detection in bulk solids. Compact design for side or top mounted applications.	7ML5725-	- - - - 0
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Process temperature			Process pressure		
Up to 80 °C (176 °F)	1		Up to 0.5 bar (7.25 psi)	1	
Up to 150 °C (302 °F)	2		Up to 5 bar (72.5 psi)	2	
Up to 250 °C (482 °F)	3		Up to 10 bar (145 psi)	3	
Up to 600 °C (1 112 °F) ¹⁾²⁾	4		Process connection material		
Up to 80 °C (176 °F) basic version aluminum ³⁾	5		Aluminum ⁷⁾	1	
Up to 80 °C (176 °F) basic version stainless steel ⁴⁾	6		Stainless steel, threads 303 (1.4305), flanges 321 (1.4541), Tri-clamp 304 (1.4301)	2	
			Stainless steel 316L (1.4404) ⁸⁾	3	
Power supply			Extension length		
230 V AC, 1 rev/min.	A		100 mm (3.94 inch) ⁹⁾	1	
230 V AC, 1 rev/min., fail-safe	B		150 mm (5.91 inch)	2	
230 V AC, 5 rev/min.	C		200 mm (7.87 inch)	3	
230 V AC, 5 rev/min., fail-safe	D		250 mm (9.84 inch)	4	
115 V AC, 1 rev/min.	E		300 mm (11.81 inch)	5	
115 V AC, 1 rev/min., fail-safe	F		Measuring vane		
115 V AC, 5 rev/min.	G		Boot shaped, 35 x 106 mm (1.38 x 4.17 inch) ¹⁰⁾	A	
115 V AC, 5 rev/min., fail-safe	H		Hinged vane, 65 x 200 mm (2.56 x 7.87 inch) ¹⁰⁾¹¹⁾	B	
48 V AC, 1 rev/min.	J		Boot shaped, 28 x 98 mm (1.10 x 3.86 inch)	C	
24 V AC, 1 rev/min.	K		Rectangular 50 x 150 mm (1.97 x 5.91 inch) ¹²⁾	D	
24 V DC, 1 rev/min.	L		Rectangular 50 x 250 mm (1.97 x 9.84 inch) ¹²⁾	E	
24 V DC, 1 rev/min., fail-safe	M		Rectangular 98 x 150 mm (3.86 x 5.91 inch) ¹¹⁾¹²⁾	F	
24 V DC, 5 rev/min.	N		Rectangular 98 x 250 mm (3.86 x 9.84 inch) ¹¹⁾¹²⁾	G	
24 V DC, 5 rev/min., fail-safe	P		Rectangular 50 x 98 mm (1.97 x 3.86 inch) ¹²⁾	H	
Switch selectable 230 V AC/115 V AC/24 V DC multi-voltage, 1 rev/min.	Q		Approvals		
Switch selectable 230 V AC/115 V AC/24 V DC multi-voltage, 5 rev/min.	R		CSA/FM Dust Ignition Proof, RCM	A	
48 V AC, 1 rev/min., fail-safe	Z	J 1 A	ATEX II 1/2 D, RCM	B	
48 V AC, 5 rev/min.	Z	J 1 B	CSA/FM General Purpose, RCM	C	
48 V AC, 5 rev/min., fail-safe	Z	J 1 C	CE, RCM	D	
24 V AC, 1 rev/min., fail-safe	Z	J 1 D	IEC Ex ta/tb IIIC	E	
24 V AC, 5 rev/min.	Z	J 1 E			
24 V AC, 5 rev/min., fail-safe	Z	J 1 F			
Universal Voltage, 1 rev/min. ¹³⁾	Z	J 2 A			
Universal Voltage, 1 rev/min, fail-safe ¹³⁾	Z	J 2 B			
Universal Voltage, 5 rev/min. ¹³⁾	Z	J 2 C			
Universal Voltage, 5 rev/min, fail-safe ¹³⁾	Z	J 2 D			
Process connection					
Threaded					
G 1¼" [(BSPP), EN ISO 228-1]	A				
G 1" [(BSPP), EN ISO 228-1]	B				
G 1½" [(BSPP), EN ISO 228-1]	C				
1" NPT [(Taper), ANSI/ASME B1.20.1]	D				
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	E				
1½" NPT [(Taper), ANSI/ASME B1.20.1]	F				
Flanged					
DN 32 PN 6, EN 1092-1 ⁵⁾	G				
DN 100 PN 6, EN 1092-1 ⁵⁾	H				
DN 100 PN 16, EN 1092-1	J				
2" ASME 150 lb B16.5	K				
3" ASME 150 lb B16.5	L				
4" ASME 150 lb B16.5	M				
2" Tri-clamp (DN 50) ISO2852 ⁶⁾	N				

1) Available with approval option C and D only, up to 0.5 bar

2) Not available with process connection A, B, D, E and G

3) Only available with the following configurations 7ML5725-5AC11-2AD0 or 7ML5725-5EE11-2AC0

4) Only available with the following configurations 7ML5725-6QC12-2AB0 or 7ML5725-6QE12-2AA0

5) Available with process pressure 1 and 2 only

6) Available with process temperature 1 only

7) Available with process connections A ... F only, process pressure option 1 and process temperature 1 and 5 only

8) Available with process connection C, F, H ... N and Measuring vane A

9) Available with measuring vane option A, C, D, E, H only

10) Add 16 mm (0.63 inch) to extension length

11) Available with extension lengths 2, 3, 4, 5

12) Available with process connections H ... M only

13) Available with approval option B, D, and E only

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ➤. For details see page 9/5 in the appendix.

➤ Available ex stock. For details see page 9/5 in the appendix.

Level Measurement

Point level measurement – Rotation paddle switches

SITRANS LPS200

Selection and Ordering data

Order code

Further Designs

Please add "-Z" to Article No. and specify Order code(s).

Heating of enclosure¹⁾²⁾

A35

Signal bulb inserted in M20 cable gland¹⁾

A20

Food grade materials (in contact with process), according to 1935/2004/EC, with FDA conform shaft sealing³⁾

K01

Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text

Y14

Additional Operating Instructions

Multi-language

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Article No.

7ML1998-5FS62

Spare Parts

Motor gear /PLC, multi-voltage

7ML1830-1KG

Replacement vane, boot shape, 35 x 106 mm (1.38 x 4.17 inch)

7ML1830-1KH

Hinged vane, 65 x 200 mm (2.56 x 7.87 inch)

7ML1830-1KJ

Rigid extension kit

(includes spring coupling, rigid tube extension and required pins)

Extension: 500, 400, 300 mm (19.7, 15.8, 11.8 inch)

7ML5711-0AA

Extension: 1 000, 900, 800, 700, 600 mm (39.4, 35.4, 31.5, 27.6, 23.6 inch)

7ML5711-1AA

Extension: 1 500, 1 400, 1 300, 1 200, 1 100 mm (59.1, 55.1, 51.2, 47.2, 43.3 inch)

7ML5711-2AA

Selection and Ordering data

Order code

Available ex stock

For details see page 9/5 in the appendix.

SITRANS LPS200, compact for up to 80 °C (176 °F), aluminum, with power supply A, process connection C, process pressure 1, process connection material 1, extension length 2, measuring vane A, and approval D

7ML1830-1KG

SITRANS LPS200, compact for up to 80 °C (176 °F), aluminum, with power supply E, process connection E, process pressure 1, process connection material 1, extension length 2, measuring vane A, and approval C

7ML5725-5EE11-2AC0

SITRANS LPS200, compact for up to 80 °C (176 °F), stainless steel, with power supply Q, process connection C, process pressure 1, process connection material 2, extension length 2, measuring vane A, and approval B

7ML5725-6QC12-2AB0

SITRANS LPS200, compact for up to 80 °C (176 °F), stainless steel, with power supply Q, process connection E, process pressure 1, process connection material 2, extension length 2, measuring vane A, and approval A

7ML5725-6QE12-2AA0

¹⁾ Available with approval option D only

²⁾ Available with power supply options A , C, E, G, J, K, L, N, J1B, J1D, J1E, J2A, J2C only

³⁾ Available up to 250 °C (482 °F). This option does not automatically implement a food conform design.

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS LPS200, shaft protected Rotary paddle switch for level and material detection in bulk solids; ideal for heavy, sticky, or high impact applications. Designed with added protection tube for enhanced shaft protection and protection against build-up on shaft (sidewall build-up).	7ML5726-		SITRANS LPS200, shaft protected Rotary paddle switch for level and material detection in bulk solids; ideal for heavy, sticky, or high impact applications. Designed with added protection tube for enhanced shaft protection and protection against build-up on shaft (sidewall build-up).	7ML5726-	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Process temperature			Process pressure		
Up to 80 °C (176 °F) ● 1			Up to 0.5 bar (7.25 psi) ▶● 1		
Up to 150 °C (302 °F) 2			Up to 5 bar (72.5 psi) 2		
Up to 250 °C (482 °F) 3			Up to 10 bar (145 psi) 3		
Up to 600 °C (1 112 °F) ¹⁾²⁾ 4			Process connection material		
Up to 80 °C (176 °F) basic version ³⁾ ▶ 5			Aluminum ⁶⁾ ● 1		
Power supply			Stainless steel, threads 303 (1.4305), flanges 321 (1.4541), Tri-clamp 304 (1.4301) ▶● 2		
230 V AC, 1 rev/min. ● A			Stainless steel 316L (1.4404) ⁷⁾ 3		
230 V AC, 1 rev/min., fail-safe B			Extension length		
230 V AC, 5 rev/min. ● C			150 mm (5.91 inch) ⁸⁾ ● 1		
230 V AC, 5 rev/min., fail-safe D			200 mm (7.87 inch) ▶● 2		
115 V AC, 1 rev/min. ● E			250 mm (9.84 inch) ● 3		
115 V AC, 1 rev/min., fail-safe F			300 mm (11.81 inch) ● 4		
115 V AC, 5 rev/min. ● G			Extension material (protection tube)		
115 V AC, 5 rev/min., fail-safe H			Aluminum ⁹⁾ ● A		
48 V AC, 1 rev/min. ● J			Stainless steel 303 (1.4305) ▶● B		
24 V AC, 1 rev/min. ● K			Stainless steel 316L (1.4404) ¹⁰⁾ C		
24 V DC, 1 rev/min. ● L			Measuring vane		
24 V DC, 1 rev/min., fail-safe M			Boot shaped 35 x 106 mm (1.38 x 4.17 inch) ¹¹⁾ ▶● A		
24 V DC, 5 rev/min. ● N			Hinged vane 65 x 200 mm (2.56 x 7.87 inch) ¹¹⁾¹²⁾ ● B		
24 V DC, 5 rev/min., fail-safe P			Rectangular 50 x 150 mm (1.97 x 5.91 inch) ¹³⁾ ● D		
Switch selectable 230 V AC/115 V AC/24 V DC ▶● Q			Rectangular 50 x 250 mm (1.97 x 9.84 inch) ¹³⁾ ● E		
multi-voltage, 1 rev/min.			Rectangular 98 x 150 mm (3.86 x 5.91 inch) ¹²⁾¹³⁾ ● F		
Switch selectable 230 V AC/115 V AC/24 V DC ● R			Rectangular 98 x 250 mm (3.86 x 9.84 inch) ¹²⁾¹³⁾ ● G		
multi-voltage, 5 rev/min.			Rectangular 50 x 98 mm (1.97 x 3.86 inch) ¹³⁾ ● H		
48 V AC, 1 rev/min., fail-safe Z		J 1 A	Approvals		
48 V AC, 5 rev/min. Z		J 1 B	CSA/FM Dust Ignition Proof, RCM ▶● 1		
48 V AC, 5 rev/min., fail-safe Z		J 1 C	ATEX II 1/2 D, RCM ▶● 2		
24 V AC, 1 rev/min., fail-safe Z		J 1 D	CSA/FM General Purpose, RCM ● 3		
24 V AC, 5 rev/min. Z		J 1 E	CE, RCM ● 4		
24 V AC, 5 rev/min., fail-safe Z		J 1 F	IEC Ex ta/tb IIIC ● 5		
Universal Voltage, 1 rev/min. ¹⁴⁾ Z		J 2 A			
Universal Voltage, 5 rev/min. ¹⁴⁾ Z		J 2 B			
Universal Voltage, 5 rev/min., fail-safe ¹⁴⁾ Z		J 2 C			
		J 2 D			
Process connection					
<u>Threaded</u>					
G 1/4" [(BSPP), EN ISO 228-1] ● A					
G 1/2" [(BSPP), EN ISO 228-1] ▶● B					
1/4" NPT [(Taper), ANSI/ASME B1.20.1] ▶● C					
1/2" NPT [(Taper), ANSI/ASME B1.20.1] ● D					
<u>Flanged</u>					
DN 32 PN 6, EN 1092-1 ⁴⁾ E					
DN 100 PN 6, EN 1092-1 ⁴⁾ F					
DN 100 PN 16, EN 1092-1 G					
2" ASME 150 lb B16.5 H					
3" ASME 150 lb B16.5 J					
4" ASME 150 lb B16.5 K					
2" Tri-clamp (DN 50) ISO2852 ⁵⁾ L					

- 1) Available with approval option 3 and 4 only and up to max 0.5 bar
 - 2) Not available with process connections A, C, E
 - 3) Only available with the following configurations 7ML5726-5QB12-2BA2 or 7ML5726-5QC12-2BA1
 - 4) Available with process pressure 1 and 2 only
 - 5) Available with process temperature 1 only
 - 6) Available with process connections A ... E only, available with process pressure option 1 only, and process temperature 1 only
 - 7) Extension and vane will also change to 316L, only for process connection B, D, F ... L and vane A
 - 8) Available with measuring vane options A, D, E, H only
 - 9) Available with process pressure 1 and process temperature 1 only
 - 10) Available with process connections B, D, F ... L and vane A
 - 11) Add 16 mm (0.63 inch) to extension length
 - 12) Available with extension length options 2 ... 4 only
 - 13) Available with process connections F, G, H, J, K only
 - 14) Available with approval options 2, 4 and 5 only
- We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.
- ▶ Available ex stock. For details see page 9/5 in the appendix.

Level Measurement

Point level measurement – Rotation paddle switches

SITRANS LPS200

Selection and Ordering data	Order code	Selection and Ordering data	Article No.	Ord. code
Further Designs Please add "-Z" to Article No. and specify Order code(s).		SITRANS LPS200, cable extension Rotary paddle switch for level and material detection in bulk solids. Cable extension for increased length in top-mounted applications	7ML5727-	
Heating of enclosure ¹⁾²⁾ Signal bulb inserted in M20 cable gland ¹⁾	A35 A20 K01	➔ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Food grade materials (in contact with process), according to 1935/2004/EC, with FDA conform shaft sealing ³⁾	Y14	Process temperature Up to 80 °C (176 °F) Up to 150 °C (302 °F) Up to 250 °C (482 °F)	1 2 3	
Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	Y14	Up to 600 °C (1 112 °F) ¹⁾²⁾ Up to 80 °C (176 °F) basic version ³⁾	4 5	
Additional Operating Instructions Multi-language This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5FS62	Power supply 230 V AC, 1 rev/min. 230 V AC, 1 rev/min., fail-safe 230 V AC, 5 rev/min.	A B C	
Spare Parts Motor gear /PLC, multi-voltage	7ML1830-1KG	230 V AC, 5 rev/min., fail-safe 115 V AC, 1 rev/min.	D E	
Replacement vane, boot shape, 35 x 106 mm (1.38 x 4.17 inch)	7ML1830-1KH	115 V AC, 1 rev/min., fail-safe 115 V AC, 5 rev/min.	F G	
Hinged vane, 65 x 200 mm (2.56 x 7.87 inch)	7ML1830-1KJ	115 V AC, 5 rev/min., fail-safe 48 V AC, 1 rev/min.	H J	
Available ex stock For details see page 9/5 in the appendix.		24 V AC, 1 rev/min. 24 V DC, 1 rev/min.	K L	
SITRANS LPS200, extended for up to 80 °C (176 °F), power supply B, process connection B, process pressure 1, process connection material 2, extension length 2, extension material B, measuring vane A, and approval 2	7ML5726-5QB12-2BA2	24 V DC, 1 rev/min., fail-safe 24 V DC, 5 rev/min. 24 V DC, 5 rev/min., fail-safe	M N P	
SITRANS LPS200, extended for up to 80 °C (176 °F), power supply Q, process connection C, process pressure 1, process connection material 2, extension length 2, extension material B, measuring vane A, and approval 1	7ML5726-5QC12-2BA1	Switch selectable 230 V AC/115 V AC/ 24 V DC multi-voltage, 1 rev/min. Switch selectable 230 V AC/115 V AC/ 24 V DC multi-voltage, 5 rev/min.	Q R	
¹⁾ Available with approval option 4 only		48 V AC, 1 rev/min., fail-safe 48 V AC, 5 rev/min. 48 V AC, 5 rev/min., fail-safe	Z Z Z	J 1 A J 1 B J 1 C
²⁾ Available with power supply options A ,C, E, G, J, K, L, N, J1B, J1D, J1E, J2A, J2C only		24 V AC, 1 rev/min., fail-safe 24 V AC, 5 rev/min.	Z Z	J 1 D J 1 E
³⁾ Available up to 250 °C (482 °F). This option does not automatically implement a food conform design.		24 V AC, 5 rev/min., fail-safe Universal Voltage, 1 rev/min. ⁹⁾ Universal Voltage, 1 rev/min, fail-safe ⁹⁾ Universal Voltage, 5 rev/min. ⁹⁾ Universal Voltage, 5 rev/min, fail-safe ⁹⁾	Z Z Z Z Z	J 1 F J 2 A J 2 B J 2 C J 2 D
		Process connection <u>Threaded</u> G 1¼" [(BSPP), EN ISO 228-1] G 1½" [(BSPP), EN ISO 228-1] 1¼" NPT [(Taper), ANSI/ASME B1.20.1] 1½" NPT [(Taper), ANSI/ASME B1.20.1]	A B C D	
		<u>Flanged</u> DN 32 PN 6, EN 1092-1 ⁴⁾ DN 100 PN 6, EN 1092-1 ⁴⁾ DN 100 PN 16, EN 1092-1 2" ASME 150 lb B16.5 3" ASME 150 lb B16.5 4" ASME 150 lb B16.5	E F G H J K	

4

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS LPS200, cable extension Rotary paddle switch for level and material detection in bulk solids. Cable extension for increased length in top-mounted applications	7ML5727-		Further Designs Please add "-Z" to Article No. and specify Order code(s). Total insertion length: Enter the total insertion length in plain text description, max. 10 000 mm (393.70 inch) Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]; Measuring-point number/identification (max. 27 characters); specify in plain text Reinforced cable (max. 28 kN pulling force) ¹⁾ Heating of enclosure ²⁾³⁾ Signal bulb inserted in M20 cable gland ²⁾ Food grade materials (in contact with process), according to 1935/2004/EC, with FDA conform shaft sealing ⁴⁾	Y01 Y14 P01 A35 A20 K01
Process pressure Up to 0.5 bar (7.25 psi) ● Up to 5 bar (72.5 psi) Up to 10 bar (145 psi)	1 2 3		Additional Operating Instructions Article No. Multi-language This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	7ML1998-5FS62
Process connection material Aluminum ⁵⁾ ● Stainless steel, threads 303 (1.4305), flanges 321 (1.4541) ●	1 2		Spare Parts Motor gear /PLC, multi-voltage Replacement vane, boot shape, 35 x 106 mm (1.38 x 4.17 inch) Hinged vane, 65 x 200 mm (2.56 x 7.87 inch) Rope extension kit, 2 m (6.56 ft)	7ML1830-1KG 7ML1830-1KH 7ML1830-1KJ 7ML1830-1KK
Cable extension length Standard cable length, 2 000 mm (78.74 inch) ● Add Order code Y01 and plain text: "Insertion length ... mm" 500 ... 1 000 mm (19.69 ... 39.37 inch) ● Cable length 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ● Cable length 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ● Cable length 3 001 ... 4 000 mm (118.15 ... 157.48 inch) ● Cable length 4 001 ... 5 000 mm (157.52 ... 196.85 inch) ● Cable length 5 001 ... 6 000 mm (196.89 ... 236.22 inch) ● Cable length 6 001 ... 7 000 mm (236.26 ... 275.59 inch) ● Cable length 7 001 ... 10 000 mm (275.63 ... 393.70 inch) ● Without extension ⁸⁾	0 1 2 3 4 5 6 7 8 9	N 1 A	Available ex stock For details see page 9/5 in the appendix. SITRANS LPS200, cable extension for up to 80 °C (176 °F), power supply Q, process connection B, process pressure 1, process connection material 2, extension length 0, measuring vane A, and approval B SITRANS LPS200, cable extension for up to 80 °C (176 °F), power supply Q, process connection C, process pressure 1, process connection material 2, extension length 0, measuring vane A, and approval A	7ML5727-5QB12-0AB0 7ML5727-5QC12-0AA0
Measuring vane Boot shaped, 35 x 106 mm (1.38 x 4.17 inch) ⁶⁾ ● Hinged vane, 65 x 200 mm (2.56 x 7.87 inch) ⁶⁾ ● Boot shaped, 28 x 98 mm (1.10 x 3.86 inch) ⁷⁾ ● Rectangular 50 x 150 mm (1.97 x 5.91 inch) ⁷⁾ ● Rectangular 50 x 250 mm (1.97 x 9.84 inch) ⁷⁾ ● Rectangular 98 x 150 mm (3.86 x 5.91 inch) ⁷⁾ ● Rectangular 50 x 98 mm (1.97 x 3.86 inch) ⁷⁾ ●	A B C D E F G		¹⁾ Available only for process temperature up to 80 °C (176 °F) and process connection material 2 ²⁾ Available with approval option D only ³⁾ Available with power supply options A ,C, E, G, J, K, L, N, J1B, J1D, J1E, J2A, J2C only ⁴⁾ Available up to 250 °C (482 °F). This option does not automatically implement a food conform design	
Approvals CSA/FM Dust Ignition Proof, RCM ● ATEX II 1/2 D, RCM ● CSA/FM General Purpose, RCM ● CE, RCM ● IEC Ex ta/tb IIIC	A B C D E			

- 1) Available with approval option C and D up to max. 0.5 bar
 2) Not available with process connections A, C, E
 3) Only available with the following configurations 7ML5727-5QC12-0AA0 or 7ML5727-5QB12-0AB0
 4) Available with process pressure 1 and 2 only
 5) Available with process connections A ... E only, process pressure option 1 only and process temperature options 1 and 5 only
 6) Add 16 mm (0.63 inch) to extension length
 7) Available with process connections F ... K only
 8) Not available with P01 and available with Approval D, mounting kit for rope extension included
 9) Available with approval options B,D, and E only
 ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Level Measurement

Point level measurement – Rotation paddle switches

SITRANS LPS200

Selection and Ordering data

Article No. Ord. code

SITRANS LPS200, angled extension

Rotary paddle switch with robust design for level and material detection in bulk solids; ideal for heavy or sticky applications. Angled extension is designed to avoid falling material and rotates horizontally in side mount applications to continue working even with heavy build-up.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process temperature

Up to 80 °C (176 °F)
Up to 150 °C (302 °F)
Up to 250 °C (482 °F)

Power supply

230 V AC, 1 rev/min.
230 V AC, 1 rev/min., fail-safe
230 V AC, 5 rev/min.
230 V AC, 5 rev/min., fail-safe
115 V AC, 1 rev/min.
115 V AC, 1 rev/min., fail-safe
115 V AC, 5 rev/min.
115 V AC, 5 rev/min., fail-safe
48 V AC, 1 rev/min.
24 V AC, 1 rev/min.
24 V DC, 1 rev/min.
24 V DC, 1 rev/min., fail-safe
24 V DC, 5 rev/min.
24 V DC, 5 rev/min., fail-safe
Switch selectable 230 V AC/115 V AC/24 V DC multi-voltage, 1 rev/min.
Switch selectable 230 V AC/115 V AC/24 V DC multi-voltage, 5 rev/min.
48 V AC, 1 rev/min., fail-safe
48 V AC, 5 rev/min.
48 V AC, 5 rev/min., fail-safe
24 V AC, 1 rev/min., fail-safe
24 V AC, 5 rev/min.
24 V AC, 5 rev/min., fail-safe
Universal Voltage, 1 rev/min.²⁾
Universal Voltage, 1 rev/min, fail-safe²⁾
Universal Voltage, 5 rev/min.²⁾
Universal Voltage, 5 rev/min, fail-safe²⁾

7ML5728-

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ZJ 1 A
J 1 B
J 1 C
J 1 D
J 1 E
J 1 F
J 2 A
J 2 B
J 2 C
J 2 D

Process connection

Flanged
DN 100 PN 6, EN 1092-1¹⁾
DN 100 PN 16, EN 1092-1
4" ASME 150 lb B16.5

Process pressure

Up to 0.5 bar (7.25 psi)
Up to 5 bar (72.5 psi)
Up to 10 bar (145 psi)

Process connection material

Stainless steel 303/321 (1.4305/1.4541)

Extension length

125 mm (4.92 inch)
150 mm (5.91 inch)
200 mm (7.87 inch)
250 mm (9.84 inch)
300 mm (11.81 inch)

1
2
3
4
5

Selection and Ordering data

Article No. Ord. code

SITRANS LPS200, angled extension

Rotary paddle switch with robust design for level and material detection in bulk solids; ideal for heavy or sticky applications. Angled extension is designed to avoid falling material and rotates horizontally in side mount applications to continue working even with heavy build-up.

Measuring vane

Rectangular vane, 50 x 98 mm (1.97 x 3.86 inch)
Rectangular vane, 50 x 150 mm (1.97 x 5.91 inch)
Rectangular vane, 50 x 250 mm (1.97 x 9.84 inch)
Rectangular vane 98 x 150 mm (3.86 x 5.91 inch)
Rectangular vane 98 x 250 mm (3.86 x 9.84 inch)
Hinged vane, 65 x 200 mm (2.56 x 7.87 inch)

Approvals

CSA/FM Dust Ignition Proof, RCM
ATEX II 1/2 D, RCM
CSA/FM General Purpose, RCM
CE, RCM
IEC Ex ta/tb IIIC

- ¹⁾ Available with process pressure 1 and 2 only
²⁾ Available with approval option B,D, and E only

7ML5728-

- 0

A
B
C
D
E
F
A
B
C
D
E

Selection and Ordering data

Order code

Further Designs

Please add "-Z" to Article No. and specify Order code(s).

Heating of enclosure¹⁾²⁾

A35

Signal bulb inserted in M20 cable gland¹⁾

A20

Food grade materials (in contact with process), according to 1935/2004/EC, with FDA conform shaft sealing³⁾

K01

Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text

Y14

Additional Operating Instructions

Multi-language
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Article No.

7ML1998-5FS62

Spare Parts

Motor gear /PLC, multi-voltage

7ML1830-1KG

Replacement vane, boot shape, 35 x 106 mm (1.38 x 4.17 inch)

7ML1830-1KH

Hinged vane, 65 x 200 mm (2.56 x 7.87 inch)

7ML1830-1KJ

- ¹⁾ Available with approval option D only
²⁾ Available with power supply options A, C, E, G, J, K, L, N, J1B, J1D, J1E, J2A, J2C only
³⁾ This option does not automatically implement a food conform design

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS LPS200, rigid extension Rotary paddle switch for top mount point level and material detection in bulk solids	7ML5730-		SITRANS LPS200, rigid extension Rotary paddle switch for top mount point level and material detection in bulk solids	7ML5730-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Process temperature			Process pressure		
Up to 80 °C (176 °F)	1		Up to 0.5 bar (7.25 psi)	1	
Up to 150 °C (302 °F)	2		Up to 5 bar (72.5 psi)	2	
Up to 250 °C (482 °F)	3		Up to 10 bar (145 psi)	3	
Up to 600 °C (1 112 °F) ¹⁾²⁾	4		Process connection material		
Power supply			Aluminum ⁵⁾	1	
230 V AC, 1 rev/min.	A		Stainless steel, threads 303 (1.4305), flanges 321 (1.4541), Tri-clamp 304 (1.4301)	2	
230 V AC, 1 rev/min., fail-safe	B		Stainless steel 316L (1.4404) ⁶⁾	3	
230 V AC, 5 rev/min.	C		Extension material (protection tube)		
230 V AC, 5 rev/min., fail-safe	D		Aluminum ⁷⁾⁸⁾	0	
115 V AC, 1 rev/min.	E		Stainless steel 303 (1.4305) ⁹⁾	1	
115 V AC, 1 rev/min., fail-safe	F		Stainless steel 316L (1.4404) ¹⁰⁾¹¹⁾	2	
115 V AC, 5 rev/min.	G		Extension length		
115 V AC, 5 rev/min., fail-safe	H		Aluminum		
48 V AC, 1 rev/min.	J		250 ... 500 mm (9.84 ... 19.69 inch)		A
24 V AC, 1 rev/min.	K		501 ... 750 mm (19.72 ... 29.53 inch)		B
24 V DC, 1 rev/min.	L		751 ... 1 000 mm (29.57 ... 39.37 inch)		C
24 V DC, 1 rev/min., fail-safe	M		1 001 ... 1 250 mm (39.41 ... 42.21 inch)		D
24 V DC, 5 rev/min.	N		1 251 ... 1 500 mm (49.25 ... 59.06 inch)		E
24 V DC, 5 rev/min., fail-safe	P		1 501 ... 1 750 mm (59.09 ... 68.90 inch)		F
Switch selectable 230 V AC/115 V AC/24 V DC multi-voltage, 1 rev/min.	Q		1 751 ... 2 000 mm (68.94 ... 78.74 inch)		G
Switch selectable 230 V AC/115 V AC/24 V DC multi-voltage, 5 rev/min.	R		2 001 ... 2 250 mm (78.78 ... 88.58 inch)		H
48 V AC, 1 rev/min., fail-safe	Z	J1A	2 251 ... 2 500 mm (88.62 ... 98.43 inch)		J
48 V AC, 5 rev/min.	Z	J1B	2 501 ... 2 750 mm (98.46 ... 108.27 inch)		K
48 V AC, 5 rev/min., fail-safe	Z	J1C	2 751 ... 3 000 mm (108.31 ... 118.11 inch)		L
24 V AC, 1 rev/min., fail-safe	Z	J1D	3 001 ... 3 250 mm (118.15 ... 127.95 inch)		M
24 V AC, 5 rev/min.	Z	J1E	3 251 ... 3 500 mm (127.99 ... 137.80 inch)		N
24 V AC, 5 rev/min., fail-safe	Z	J1F	3 501 ... 3 750 mm (137.83 ... 147.64 inch)		P
Universal Voltage, 1 rev/min. ¹⁴⁾	Z	J2A	3 751 ... 4 000 mm (147.67 ... 157.48 inch)		Q
Universal Voltage, 1 rev/min, fail-safe ¹⁴⁾	Z	J2B	Stainless steel 303 (1.4305)		
Universal Voltage, 5 rev/min. ¹⁴⁾	Z	J2C	250 ... 500 mm (9.84 ... 19.69 inch)		R
Universal Voltage, 5 rev/min, fail-safe ¹⁴⁾	Z	J2D	501 ... 750 mm (19.72 ... 29.53 inch)		S
Process connection			751 ... 1 000 mm (29.57 ... 39.37 inch)		T
Threaded			1 001 ... 1 500 mm (39.41 ... 59.05 inch)		U
G 1¼" [(BSPP), EN ISO 228-1]	A		1 501 ... 2 000 mm (59.09 ... 78.74 inch)		V
G 1½" [(BSPP), EN ISO 228-1]	B		2 001 ... 2 500 mm (78.78 ... 98.42 inch)		W
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	C		2 501 ... 3 000 mm (98.46 ... 118.11 inch)		X
1½" NPT [(Taper), ANSI/ASME B1.20.1]	D		3 001 ... 4 000 mm (118.15 ... 157.48 inch)		Y
Flanged			Stainless steel 316L (1.4404)		
DN 32 PN 6, EN 1092-1 ³⁾	E		250 ... 500 mm (9.84 ... 19.69 inch)		Z
DN 100 PN 6, EN 1092-1 ³⁾	F		501 ... 750 mm (19.72 ... 29.53 inch)		P1A
DN 100 PN 16, EN 1092-1	G		751 ... 1 000 mm (29.57 ... 39.37 inch)		P1B
2" ASME 150 lb B16.5	H		1 001 ... 1 500 mm (39.41 ... 59.05 inch)		P1C
3" ASME 150 lb B16.5	J		1 501 ... 2 000 mm (59.09 ... 78.74 inch)		P1D
4" ASME 150 lb B16.5	K		2 001 ... 2 500 mm (78.78 ... 98.42 inch)		P1E
2" Tri-clamp 2" (DN 50) ISO2852 ⁴⁾	L		2 501 ... 3 000 mm (98.46 ... 118.11 inch)		P1F
			3 001 ... 4 000 mm (118.5 ... 157.48 inch)		P1G
					P1H

Level Measurement

Point level measurement – Rotation paddle switches

SITRANS LPS200

Selection and Ordering data

Article No. Ord. code

SITRANS LPS200, rigid extension

Rotary paddle switch for top mount point level and material detection in bulk solids

7ML5730-

Measuring vane

Boot shaped, 35 x 106 mm (1.34 x 4.17 inch)¹²⁾

Hinged vane, 60 x 200 mm (2.36 x 7.87 inch)¹²⁾

Rectangular 50 x 150 mm (1.97 x 5.91 inch)¹³⁾

Rectangular 50 x 250 mm (1.97 x 9.84 inch)¹³⁾

Rectangular 98 x 150 mm (3.86 x 5.91 inch)¹³⁾

Rectangular 98 x 250 mm (3.86 x 9.84 inch)¹³⁾

Rectangular 50 x 98 mm (1.97 x 3.86 inch)¹³⁾

Approvals

CSA/FM Dust Ignition Proof, RCM

ATEX II 1/2 D, RCM

CSA/FM General Purpose, RCM

CE, RCM

IEC Ex ta/tb IIIC

A
B
C
D
E
F
G1
2
3
4
5

- 1) Available with approval option 3 and 4, up to max 0.5 bar
- 2) Not available with process connection A, C, E
- 3) Available with process pressure 1 and 2 only
- 4) Available with process temperature 1 only
- 5) Available with process connections A ... E only, with process pressure option 1 only and process temperature 1 only
- 6) Available with process connection B, D, F ... L and measuring vane option A
- 7) Available with process pressure 1 and process temperature 1 only
- 8) Available with extension length options A ... Q only
- 9) Available with extension length options R ... Y only
- 10) Available with process connection B, D, F ... L and measuring vane A, process connection material 3. Available only with extension length options P1A ... P1H only
- 11) Only available with seal at tube end, option P06 ... P09
- 12) Add 16 mm (0.63 inch) to extension length
- 13) Available with process connections F, G, H, J, K only
- 14) Available with approval options 2, 4 and 5 only
- We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix

Selection and Ordering data

Order code

Further Designs

Please add "-Z" to Article No. and specify Order code(s).

Total insertion length: Enter the total insertion length in plain text description, max. 4 000 mm (157.48 inch)

Y01

Stainless steel tag [100 x 45 mm (3.94 x 1.77 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text

Y14

Heating of enclosure¹⁾²⁾

A35

Signal bulb inserted in M20 cable gland¹⁾

A20

Food grade materials (in contact with process), according to 1935/2004/EC, with FDA conform shaft sealing³⁾⁴⁾

K01

Seal at tube end for ingress protection and shaft stability

Max. temperature 80 °C (176 °F)

P06

Max. temperature 150 °C (302 °F)

P07

Max. temperature 250 °C (482 °F)

P08

Max. temperature 600 °C (1 112 °F)

P09

Sliding sleeve (standard, max. pressure 0.5 bar)¹⁾⁵⁾

P12

Sliding sleeve (pressure tight, for over-pressure application starting from 1 bar max., dependent on pressure option ordered)⁶⁾

P13

Additional Operating Instructions

Article No.

Multi-language

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

7ML1998-5FS62

Spare Parts

Motor gear/PLC, multi-voltage

7ML1830-1KG

Replacement vane, boot shape, 35 x 106 mm (1.38 x 4.17 inch)

7ML1830-1KH

Hinged vane, 65 x 200 mm (2.56 x 7.87 inch)

7ML1830-1KJ

1) Available with approval option 4 only

2) 15) Available with power supply options A, C, E, G, J, K, L, N, J1B, J1D, J1E, J2A, J2C only

3) Available when ordered with ingress protection seal P06 ... P09 only

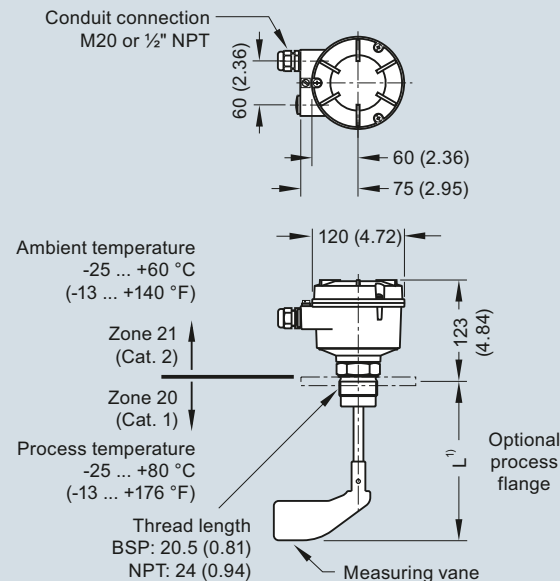
4) Available up to 250 °C (482 °F). This option does not automatically implement a food conform design

5) Available with process pressure 1 only

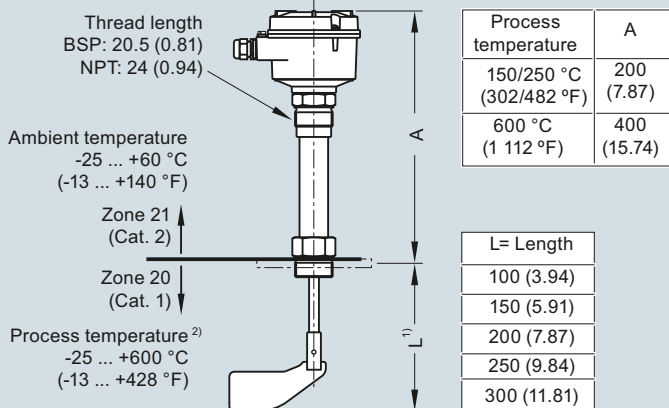
6) Available up to 250 °C (482 °F)

Dimensional drawings

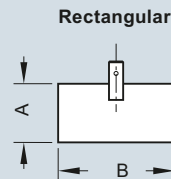
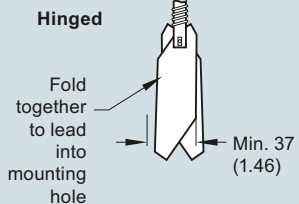
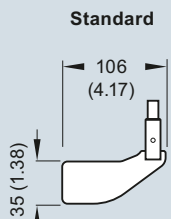
Standard model: compact version



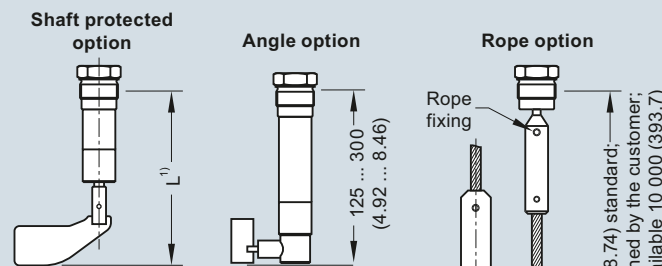
High temperature model: compact version



Measuring vanes



Rectangular vane options	
A	B
50 (1.97)	98 (3.86)
50 (1.97)	150 (5.90)
50 (1.97)	250 (9.84)
98 (3.86)	150 (5.90)
98 (3.86)	250 (9.84)



Vane	Completely covered with material		Covered up to 10 cm (3.93 inch) with material	
	Spring adjustment		Spring adjustment	
	Light	Central (factory setting)	Light	Central (factory setting)
boot shaped 35 x 106 mm	200 g/l (12.5 lb/ft³)	300 g/l (18.7 lb/ft³)	100 g/l (6.2 lb/ft³)	150 g/l (9.4 lb/ft³)
boot shaped 28 x 98 mm	300 g/l (18.7 lb/ft³)	500 g/l (31.2 lb/ft³)	150 g/l (9.4 lb/ft³)	150 g/l (9.4 lb/ft³)
rectangular 50 x 98 mm	300 g/l (18.7 lb/ft³)	500 g/l (31.2 lb/ft³)	150 g/l (9.4 lb/ft³)	250 g/l (15.6 lb/ft³)
rectangular 50 x 150 mm	80 g/l (5.0 lb/ft³)	120 g/l (7.5 lb/ft³)	40 g/l (2.5 lb/ft³)	60 g/l (3.7 lb/ft³)
rectangular 50 x 250 mm	30 g/l (1.9 lb/ft³)	50 g/l (3.1 lb/ft³)	15 g/l (0.9 lb/ft³)	25 g/l (1.6 lb/ft³)
rectangular 98 x 150 mm	30 g/l (1.9 lb/ft³)	50 g/l (3.1 lb/ft³)	15 g/l (0.9 lb/ft³)	25 g/l (1.6 lb/ft³)
rectangular 98 x 250 mm	20 g/l (1.2 lb/ft³)	30 g/l (1.9 lb/ft³)	15 g/l (0.9 lb/ft³)	15 g/l (0.9 lb/ft³)
hinged 65 x 210 mm	70 g/l (4.4 lb/ft³)	100 g/l (6.2 lb/ft³)	35 g/l (2.2 lb/ft³)	50 g/l (3.1 lb/ft³)
hinged 60 x 200 mm	70 g/l (4.4 lb/ft³)	100 g/l (6.2 lb/ft³)	35 g/l (2.2 lb/ft³)	50 g/l (3.1 lb/ft³)

- For 35 x 106 mm boot shaped and 65 x 210 mm hinged measuring vanes, add 16 mm to extension length.
- For use with all approval options except CSA class II. See manual for more details.

Notes

For heavy material, only top mounting of paddle switch is recommended.
Compact LPS200 is recommended for side mounting on bins for low or intermediate material levels.

SITRANS LPS200, dimensions in mm (inch)

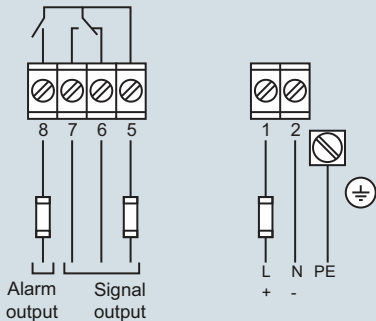
Level Measurement

Point level measurement – Rotation paddle switches

SITRANS LPS200

Schematics

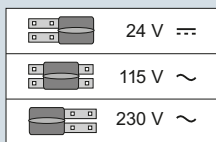
AC or DC version, SPDT, fail-safe



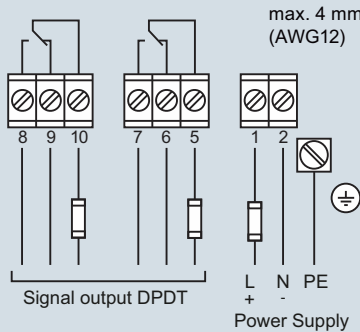
Switching and timing behaviour:
If the vane is not covered, the rotating vane shaft will send pulses at 20 second intervals.
In case of fault, the pulses are missed. After 30 seconds, the alarm relay will open.

OR $\frac{24\text{ V or }48\text{ V or }115\text{ V or }230\text{ V AC, }50/60\text{ Hz, }5\text{ VA}}{24\text{ VDC, }2.5\text{ W All voltages } \pm 15\%}$

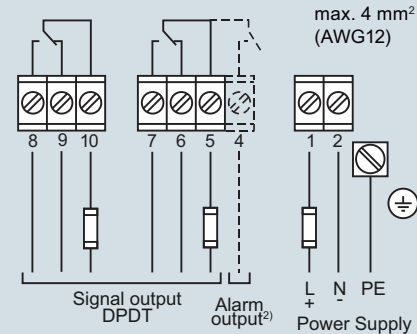
Voltage selector



AC version DPDT FSH/FSL



Universal voltage (DPDT relay)



²⁾With option Fail safe alarm (rotation control)
Contact open when de-energised

SITRANS LPS200 connections

4

Overview

The Pointek ULS200 is an ultrasonic non-contacting switch with two switch points for level detection of bulk solids, liquids and slurries in a wide variety of industries; ideal for sticky materials.

Benefits

- 2 switch outputs for high-high, high, low and low-low level alarms or pump up/pump down control
- Integral temperature compensation
- AC or DC power supply
- Electronics provided with fail-safe function
- Threaded and sanitary fitting clamp process connections
- Polycarbonate enclosure, Type 6/NEMA 6/IP67
- Easy, two-button programming

Application

The measuring range for bulk solids is max. 3 m (9.8 ft) and 5 m (16.4 ft) for liquids and slurries. Unlike invasive contacting devices, there is no material buildup on the sensor.

The level switch has a rugged design, combining the transducer and electronics in one durable device. It has no moving parts and is virtually maintenance-free.

The transducer, available in ETFE or PVDF copolymer, is inert to most chemicals. This means the device can be used in the chemical, petrochemical, water, and wastewater industries. A sanitary version of the ULS200, with an industry standard flange option, is easy to remove from the application for cleaning. It thus satisfies the prerequisites for use in the food, beverage, and pharmaceutical industries. The Pointek ULS200 delivers superior performance while reducing maintenance, downtime, and equipment replacement costs.

- Key Applications: liquids, slurries, fluid materials, plugged chute detection, chemical industry

Design**Installation**

The Pointek ULS200 should be mounted in an area that is within the temperature range specified and that is suitable to the enclosure rating and materials of construction. The cover should be accessible to allow programming, wiring and display viewing.

It is advisable to keep the Pointek ULS200 away from high voltage or current runs, contactors and SCR control drives.

Locate the Pointek ULS200 so that it has a clear sound path perpendicular to the material surface. The sound path should not intersect the fill path, rough walls, seams, rungs etc.

Mounting and Interconnection

The Pointek ULS200 is available in three thread types: 2" NPT, R 2" (BSPT), EN 10226 or PF2 and can be fitted with the optional 75 mm (3 inch) flange adapter for mating to 3" ASME, DN 65, PN 10, and JIS 10K 3B sized flanges.

Separate cables and conduit may be required to conform to standard instrumentation wiring or electrical codes.

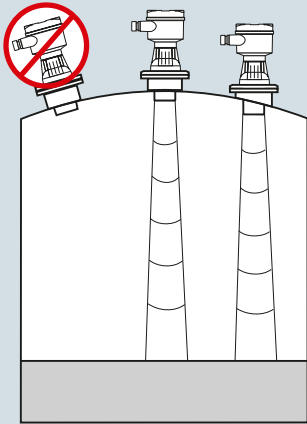
Level Measurement

Point level measurement – Ultrasonic non-contacting switch

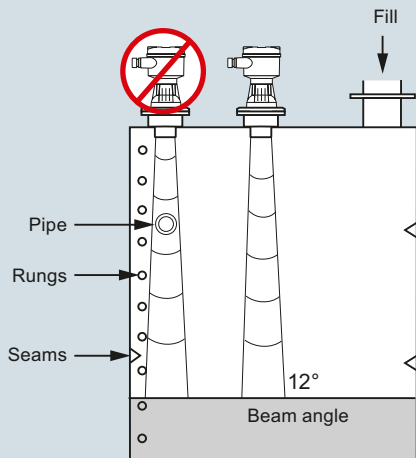
Pointek ULS200

Configuration

Parabolic mounting



Flat mounting and Beam angle



Pointek ULS200 Mounting

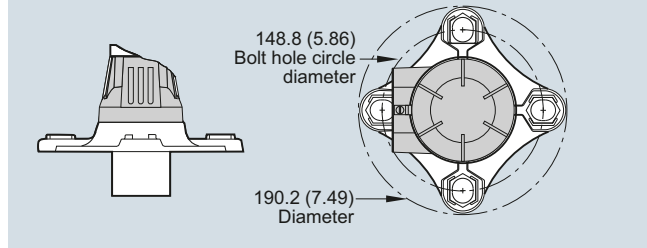
Technical specifications

Mode of operation	
Measuring principle	Ultrasonic level switch
Measuring range	
Measuring range in liquids	0.25 ... 5 m (0.8 ... 16.4 ft)
Measuring range in bulk solids	0.25 ... 3 m (0.8 ... 9.8 ft)
Output	
AC Version (relay)	2 SPDT Form C contacts, rated 5 A at 250 V AC or 30 V DC, resistive load; rated 1 A at 48 V DC resistive load
DC Version (relay)	2 SPDT Form C contacts, rated 5 A at 30 V DC, resistive load; rated 1 A at 48 V DC resistive load
DC Version (transistor)	2 switches, rated max. 100 mA, 48 V DC
Accuracy	
AC/DC version	
• Resolution	3 mm (0.1 inch)
• Repeatability	0.25 % of measuring range
Rated operation conditions	
Installation conditions	
• Location	Indoors/outdoors
• Beam angle	12°
Ambient conditions	
• Ambient temperature	-40 ... +60 °C (-40 ... +140 °F)
• If mounted in metal threads	-20 ... +60 °C (-5 ... +140 °F)
Medium conditions	
• Process pressure	0.5 bar (7.25 psi) max.
Design	
Material	Polycarbonate with gasket
Weight	Approx. 1.5 kg (3.3 lb)
Transducer material	PVDF or ETFE copolymer
Threaded mounting	2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
• Optional flange adapter	For 3" ASME, DN 65, PN 10 and JIS 10 K3B
Sanitary mounting	4" sanitary fitting clamp
Power supply	
AC version	100 ... 230 V AC, ± 15 %, 50/60 Hz, max. 12 VA, 5 W
DC version	18 ... 30 V DC, 3 W
Displays and controls	
Display	LCD, three digits, 9 mm (0.35 inch) high for display of distance between sensor face and material, multi-segment graphic for operating state
Memory	EEPROM, non-volatile
Programming	2 keys

Electronics/enclosure	Connection: terminal block, max. 2.5 mm ² (14 AWG) solid/ 1.5 mm ² (16 AWG) stranded
Degree of protection	IP67/Type 6/NEMA 6
Cable inlet	2 x ½" NPT or 2 x PG 13.5
Certificates and approvals	• CE (EMC certificate available on request), CSA US/C, FM

Options

Flange adapter for mating 2" NPT or 2" BSP process connections to 3" ASME, DN 65 PN 10 and JIS 10K 3B flanges



Pointek ULS200 Optional Flange Adapter, dimensions in mm (inch)

Level Measurement

Point level measurement – Ultrasonic non-contacting switch

Pointek ULS200

Selection and Ordering data	Article No.
Pointek ULS200 Ultrasonic non-contacting switch with two switch points for level detection of bulk solids, liquids and slurries in a wide variety of industries; ideal for sticky materials ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1510-
Power supply 24 V DC, relay output 1 24 V DC, transistor output 2 100 ... 230 V AC, relay output 3	
Approvals CE, RCM, CSA Class I, II, Div. 2 ¹⁾ J CE, RCM, CSA _{us/c} , FM K	
Transducer/Process connection ETFE, 2" NPT [(Taper), ANSI/ASME B1.20.1] A EFTE, R 2" [(BSPT), EN 10226] B EFTE, G 2" [(BSPP), EN ISO 228-1] C PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1] E PVDF copolymer, R 2" [(BSPT), EN 10226] F PVDF copolymer, G [(BSPP), EN ISO 228-1] G PVDF copolymer, 4" sanitary mounting ²⁾ J	
Enclosure/cable inlet Polycarbonate • Cable inlet PG 13.5 1 • Cable inlet 1/2" NPT 2	

¹⁾ Available with Enclosure/cable inlet option 2 only

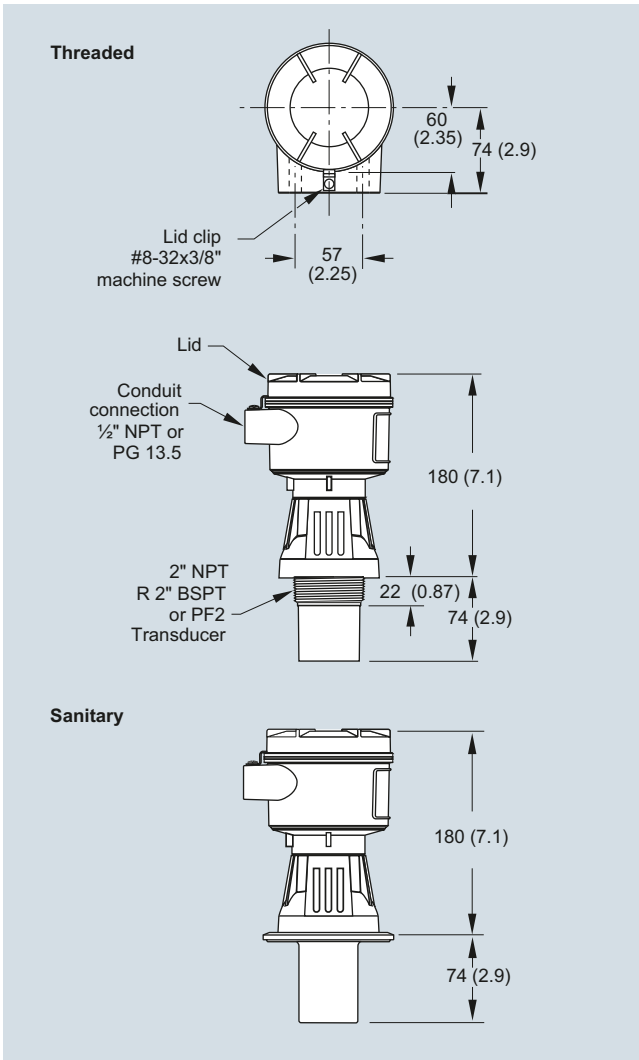
²⁾ Available with Approvals option K only

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s) Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Y15 Measuring-point number/identification (max. 27 characters) specify in plain text	
Operating Instructions Quick Start manual, multi-language This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32268616
Accessories Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosures Universal Box Bracket Mounting Kit 3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" NPT 3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" BSPT 2" BSPT Locknut, plastic 2" NPT Locknut 4" sanitary mounting clamp	7ML1930-1AC 7ML1830-1BK 7ML1830-1BT 7ML1830-1BU 7ML1830-1DQ 7ML1830-1DT 7ML1830-1BR
Spare Parts Polycarbonate Lid	7ML1830-1LG

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

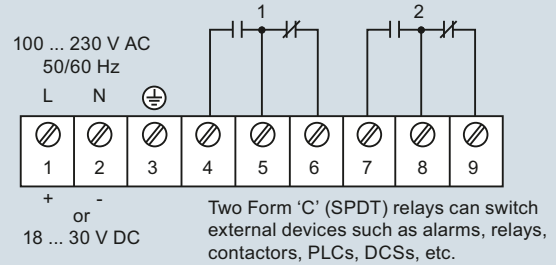
Dimensional drawings



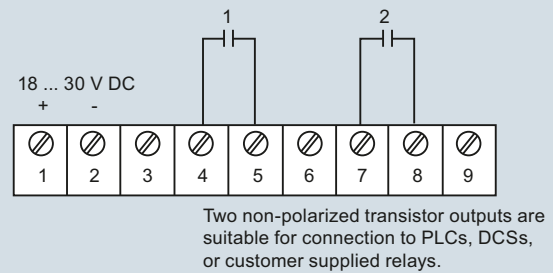
Pointek ULS200, dimensions in mm (inch)

Schematics

Relay output



Transistor output: DC version only



Pointek ULS200 connections

Level Measurement

Continuous level measurement – Ultrasonic

Ultrasonic

Overview

Introduction

Ultrasonic measurement is based on the speed of sound. Sound can be used as a measurement tool because there is a measurable time lapse between sound generation and the "hearing" of the sound. This time lapse is then converted into usable information. Ultrasonic sensing equipment generates a sound above 20 000 Hz and then interprets the time lapse of the returned echo. The transducer creates the sound and senses the echo and then a transceiver interprets the sound and converts it into information.

Siemens ultrasonic units include Sonic Intelligence, a patented signal processing technology. Using unique algorithms, Sonic Intelligence differentiates between true echoes from the material and false echoes from obstructions or electrical noise, providing intelligent processing of echo profiles.

Typical System

Ultrasonic level measurement requires two components: one to generate the sound and catch the echo (transducer) and one to interpret the data and derive a measurement (transceiver). Even though some ultrasonic instruments combine the components in one unit, the individual functionality remains distinct. The measurement output is communicated to the unit, PLCs or PCs for process control.

Principle of Operation

A piezoelectric crystal inside the transducer converts an electrical signal into sound energy, firing a burst into the air which travels to the target and then is reflected back to the transducer. The transducer then acts as a receiving device and converts the sonic energy back into an electrical signal contained in the transceiver. An electronic signal processor analyzes the return echo and calculates the distance between the transducer and the target. The time lapse between firing the sound burst and receiving the return echo is directly proportional to the distance between the transducer and the material in the vessel. This basic principle lies at the heart of the ultrasonic measurement technology and is illustrated in the equation:

$$\text{Distance} = (\text{Velocity of Sound} \times \text{Time})/2.$$

Mode of operation

Common Terms

Attenuation

Denotes a decrease in signal magnitude in transmission from one point to another. Attenuation may be expressed as a scalar ratio of the input magnitude to the output magnitude or in decibels.

Beam angle

The diameter of a conical boundary centered around the axis of transmission when the power (radiating perpendicular to the transducer face on the axis of transmission) is reduced by half (-3 dB).

Blanking distance

Specified zone extending downward from the transducer face in which received echoes are ignored by the transceiver. Blanking distance ignores echoes from ringing.

Echo confidence

The recognition of the validity of the echo as material level. A measure of echo reliability.

Ringing

The inherent nature of the transducer to continue vibrating after the transmit pulse has ceased; the decay of the transmit pulse.

Transducer/Transceiver

A transducer provides the initial ultrasonic pulse and receives its echo. An ultrasonic transducer amplifies the sound wave created by the piezoelectric crystal and transmits that sound wave to the face of the transducer while at the same time dampening the sound wave from the other sides of the crystal.

Transceivers analyze the echo from the transducer to determine the required measurement.

Technical specifications

Ultrasonic Transmitter/Controller Selection Guide

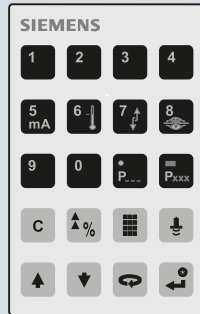
Criteria	SITRANS Probe LU	SITRANS LUT400	HydroRanger 200	MultiRanger 100/200	SITRANS LU
Range	6 m (20 ft) or 12 m (40 ft)	0.3 ... 60 m (1 ... 196 ft), transducer and application dependent	15 m (50 ft) transducer and application dependent	15 m (50 ft) transducer and application dependent	60 m (200 ft) transducer and application dependent
Typical applications	Chemical storage vessels, filter beds, liquid storage vessels	Wet wells, reservoirs, flumes/weirs, chemical storage, liquid storage, hoppers, crusher bins, dry solids storage	Wet wells, flumes/weirs, bar screen control	Wet wells, flumes/weirs, bar screen control, hoppers, chemical storage, liquid storage, crusher bins, dry solids storage	Chemical storage, liquid storage, bulk solids storage (sugar, flour bins, grains, cereals), plastic pellets
Output	HART model: 4 ... 20 mA/HART PROFIBUS PA model: PROFIBUS	4 ... 20 mA/HART 3 relays	6 relays standard, two 4 ... 20 mA outputs (isolated)	1 relay (option on MultiRanger 100) 3 relays standard 6 relays (option) Two 4 ... 20 mA outputs (isolated)	4 relays (LU01, LU02) Up to 40 relays (LU10) 4 ... 20 mA isolated
Communications	HART or PROFIBUS PA Options: • SIMATIC PDM for remote configuration and diagnostics	HART 7.0, USB, SIMATIC PDM	Built-in Modbus RTU/ASCII via RS-485 Options: • SIMATIC PDM • SmartLinx (PROFIBUS DP, DeviceNet)	Built-in Modbus RTU or ASCII via RS-485 Options: • SIMATIC PDM • SmartLinx (PROFIBUS DP, DeviceNet)	Dolphin, RS-232/RS-485 (LU01, LU02) Dolphin via infrared (LU10)
Power specifications	HART: 4 ... 20 mA, 24 V DC nominal, max. 550 Ω, 30 V DC max. PROFIBUS PA: 12, 13, 15, or 20 mA, dependent on programming	AC version: 100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA Fuse: 5 x 20 mm, Slow Blow, 0.25 A, 250 V DC version: 10 ... 32 V DC, 10 W Fuse: 5 x 20 mm, Slow Blow, 1.6 A, 125 V	AC version: 100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA/17 W DC version: 12 ... 30 V DC, 20 W	AC version: 100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA/17 W DC version: 12 ... 30 V DC, 20 W	LU01, LU02: AC version: 100/115/200/ 230 V AC DC version: 18 ... 30 V DC, 25 W LU10: 100/115/200/ 230 V AC
Approvals	CE, CSA _{US/C} , FM, RCM, ATEX, IECEx	CE, CSA _{US/C} , UL Listed, FM, RCM, Lloyd's Register, ABS	CE, CSA _{US/C} , UL Listed, FM, RCM	CE, CSA _{US/C} , UL Listed, FM, RCM	CE, CSA _{US/C} , FM, Lloyd's Register

Level Measurement

Continuous level measurement – Ultrasonic

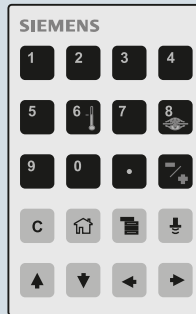
Ultrasonic

7ML1830-2AN



SITRANS Probe LU HART*
SITRANS LU

7ML5830-2AJ



SITRANS Probe LU PROFIBUS

7ML1830-2AK



MultiRanger 100/200
HydroRanger 200

* **Note:** To order the IS version of this hand programmer, order 7ML5830-2AH.

Handheld programmer selection guide

Application

SIEMENS

Ultrasonic Level Application Questionnaire

Customer information

Contact: _____ Prepared By: _____
 Company: _____ Date: _____
 Address: _____ Notes on the Application: _____
 City: _____ Country: _____
 Zip/Postal Code: _____ Phone: () _____
 Fax: () _____ E-mail: _____

Tanks/Vessel information (Supply sketch where possible) Sketch attached

Type: Storage Process Pump station Open channel

Dimensions:
 Height: _____ m/ft
 Width/Diameter: _____ m/ft

Critical Information

Nozzle Length: _____ cm/inch
Nozzle Diameter: _____ cm/inch

Tank top: Open Flat Conical Parabolic

Tank bottom: Sloped Flat Conical Parabolic

Internal equipment and/or obstructions: No Yes Please list _____
 (Eg. Agitator, heating coils, supports, other)

Measurement type: Point Level Continuous Level Volume Flow

Area safety classification: (Specify code required) _____

Material

Material being measured: _____ Slurry Liquid Solid

Material temperature: Norm: _____ °C/°F Max: _____ °C/°F

Atmosphere: Air Other _____ **Homogenous:** Yes No

Dust: None Light Heavy

Installation

(indicate all that apply)

Power available: _____

Communications:

Inputs required: 4 ... 20 mA Pump Interlocks (#): _____

Outputs required: 4 ... 20 mA Relays (#): _____

HART/4 ... 20 mA PROFIBUS DP PROFIBUS PA Modbus RTU/ASCII

AB Remote I/O AB DeviceNet Other None

Products recommended:

Level Measurement

Continuous level measurement – Ultrasonic transmitters

SITRANS Probe LU

Overview



SITRANS Probe LU is a 2-wire loop powered ultrasonic transmitter for level, volume and flow monitoring of liquids in open channels, storage vessels, and simple process vessels.

Benefits

- Continuous level measurement up to 12 m (40 ft) range
- Easy installation and simple start-up
- Programming using infrared Intrinsically Safe handheld programmer, SIMATIC PDM or HART Communicator
- Communication using HART or PROFIBUS PA
- ETFE or PVDF transducers for chemical compatibility
- Patented Sonic Intelligence signal processing
- Auto False-Echo Suppression for fixed obstruction avoidance
- Level to volume or level to flow conversion

Application

The SITRANS Probe LU is ideal for level monitoring in the water and wastewater industry, chemical storage vessels, and small bulk hoppers.

The range of SITRANS Probe LU is 6 or 12 m (20 or 40 ft). Using Sonic Intelligence, Auto False Echo Suppression for fixed obstruction avoidance, and accuracy of 0.15 % of range or 6 mm (0.25 inch), the Probe LU provides unmatched reliability.

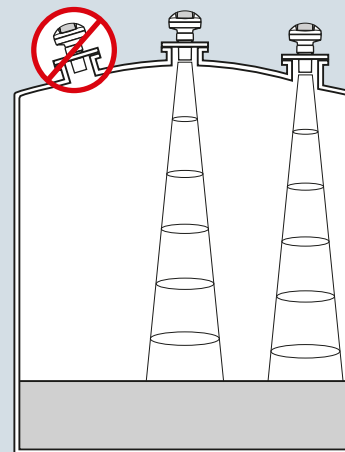
The Probe LU offers two communications options: HART or PROFIBUS PA (Profile version 3.0, Class B).

The transducer on the Probe LU is available as ETFE or PVDF to suit the chemical conditions of your application. As well, for applications with varying material and process temperatures, the Probe LU incorporates an internal temperature sensor to compensate for temperature changes.

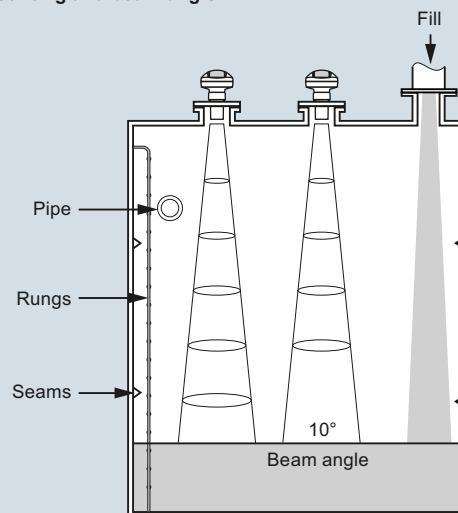
- Key Applications: chemical storage vessels, filter beds, liquid storage vessels

Configuration

Parabolic mounting



Flat mounting and beam angle



SITRANS Probe LU mounting

Technical specifications

Mode of operation		Process connection	
Measuring principle	Ultrasonic level measurement	• Threaded connection	2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
Typical application	Level measurement in storage vessels and simple process vessels	• Flange connection	3 inch (80 mm) universal flange
Inputs		• Other connection	FMS 200 mounting bracket (see page 4/187) or customer supplied mount
Measuring range		Display and Controls	
• 6 m (20 ft) model	0.25 ... 6 m (10 inch ... 20 ft)	Interface	Local: LCD display with bar graph Remote: Available via HART or PROFIBUS PA
• 12 m (40 ft) model	0.25 ... 12 m (10 inch ... 40 ft)	Configuration	Using Siemens SIMATIC PDM (PC) or HART handheld communicator or Siemens infrared handheld programmer
Frequency	54 kHz	Memory	Non-volatile EEPROM
Outputs		Power supply	
mA/HART		4 ... 20 mA/HART	Nominal 24 V DC with 550 Ω maximum; maximum 30 V DC 4 ... 20 mA
• Range	4 ... 20 mA	PROFIBUS PA	12, 13, 15, or 20 mA depending on programming (General Purpose or Intrinsically Safe version) per IEC 61158-2
• Accuracy	± 0.02 mA	Certificates and Approvals	
PROFIBUS PA	Profile 3, Class B	General	CSA _{US/C} , FM, CE, RCM
Performance		Marine (only applies to HART communication option)	• Lloyd's Register of Shipping • ABS Type Approval
Resolution	≤ 3 mm (0.12 inch)	Hazardous	
Accuracy	± the greater of 0.15 % of range or 6 mm (0.24 inch)	• Intrinsically Safe (Europe)	ATEX II 1G Ex ia IIC T4 Ga
Repeatability	≤ 3 mm (0.12 inch)	• Intrinsically Safe (USA/Canada)	CSA/FM, Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
Blanking distance	0.25 m (10 inch)	• Intrinsically Safe (International)	SIR 13.0008X Ex ia IIC T4 Ga
Update time	≤ 5 s	• Intrinsically Safe (Brazil)	INMETRO Ex ia IIC T4 Ga
• 4 ... 20 mA/HART version	≤ 5 s at 4 mA	• Non-incendive (USA)	FM Class I, Div. 2, Groups A, B, C, D T4
• PROFIBUS version	≤ 4 s at 15 mA current loop	Handheld Programmer	
Temperature compensation	Built-in to compensate over temperature range	Intrinsically Safe Siemens handheld programmer	Infrared receiver
Beam angle	10°	• Approvals for handheld programmer	ATEX II 1GD / IECEx SIR 09.0073 Ex ia IIC T4 Ga Ex iaD 20 T135 °C FM/CSA Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G T6
Rated operating conditions		Ambient temperature	-20 ... 50 °C (-5 ... 122 °F)
Ambient conditions		Interface	Proprietary infrared pulse signal
• Location	Indoor/outdoor	Power	3 V lithium battery (non-replaceable)
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)		
• Relative humidity/ingress protection	Suitable for outdoor		
• Installation category	I		
• Pollution degree	4		
• Medium conditions			
- Temperature at flange or threads	-40 ... +85 °C (-40 ... +185 °F)		
- Pressure (vessel)	0.5 bar g (7.25 psi g)		
Design			
Material (enclosure)	PBT (Polybutylene Terephthalate)		
Degree of protection	Type 4X/NEMA 4X, Type 6/ NEMA 6/IP67/IP68 enclosure		
Weight	2.1 kg (4.6 lb)		
Cable inlet	2 x M20x1.5 cable gland or 2 x ½" NPT thread or 1 x M20 x 1.5 and 1 x ½" NPT		
Material (transducer)	ETFE (Ethylene Tetrafluoroethylene) or PVDF (Polyvinylidene Fluoride)		

Level Measurement

Continuous level measurement – Ultrasonic transmitters

SITRANS Probe LU

Selection and Ordering data	Article No.
SITRANS Probe LU 2-wire, loop powered ultrasonic transmitter for level, volume and flow monitoring of liquids in open channels, storage vessels, and simple process vessels.	7ML5221-
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Enclosure/Cable Inlet	
Plastic (PBT), 1 x M20x1.5 and 1 x ½" NPT (no cable glands supplied)	0
Plastic (PBT), 2 x M20x1.5 (includes 1 general purpose cable gland: 7ML1930-1AM)	1
Plastic (PBT), 2 x ½" NPT (no cable glands supplied)	2
Range/Transducer material	
6 m (20 ft), ETFE	A
6 m (20 ft), PVDF Copolymer	B
12 m (40 ft), ETFE	C
12 m (40 ft), PVDF Copolymer	D
Process connection	
2" NPT [(Taper), ANSI/ASME B1.20.1]	A
R 2" [(BSPT), EN 10226]	B
G 2" [(BSPP), EN ISO 228-1]	C
Communication/Output	
4 ... 20 mA, HART	1
PROFIBUS PA	2
Approvals	
General Purpose, FM, CSA _{US/C} , CE, RCM, KCC	1
Non-incendive, FM Class I, Div. 2 Groups A,B,C,D T5 ¹⁾	4
Intrinsically Safe, CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4 ²⁾	5
Intrinsically Safe ATEX 1G / JECEX / INMETRO Ex ia IIC T4 Ga, RCM, KCC ²⁾	6
Intrinsically Safe ATEX 1G / JECEX / INMETRO Ex ia IIC T4 Ga, RCM, KCC ³⁾	7
Intrinsically safe, CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1 Groups E, F, G; Class III T4 ³⁾	8

1) Available with Enclosure/Cable Inlet option 2 only.

2) Available with communication option 2 only.

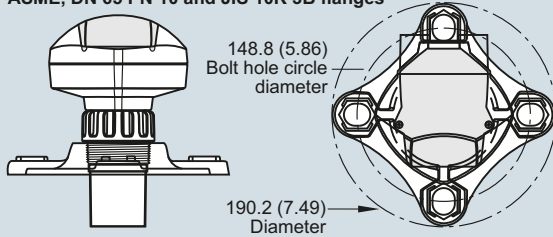
3) Available with communication option 1 only.

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	◆ Y15
Operating Instructions for HART/mA device	Article No.
English	A5E32337695
French	7ML1998-5HT11
German	A5E34957881
Note: The Operating Instructions should be ordered as a separate item on the order.	
Additional Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E32168031
Operating Instructions for PROFIBUS PA device	
English	A5E32337708
German	A5E34957884
Note: The Operating Instructions should be ordered as a separate item on the order.	
Additional Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E32081626
Accessories	
Handheld programmer, Intrinsically Safe, EEx ia	7ML5830-2AH
Handheld programmer, General Purpose approvals	7ML1830-2AN
Handheld programmer, Infrared, Intrinsically Safe, PROFIBUS PA	7ML5830-2AJ
HART modem/USB (for use with a PC and SIMATIC PDM)	7MF4997-1DB
2" NPT locknut, plastic	7ML1830-1DT
2" BSPT locknut, plastic	7ML1830-1DQ
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" NPT	7ML1830-1BT
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" BSPT	7ML1830-1BU
One General Purpose polymeric cable gland M20x1.5, rated for -20 ... +80 °C (-4 ... +176 °F)	7ML1930-1AM
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F) for General Purpose or ATEX EEx e installations (available for HART only)	7ML1930-1AP
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F) with integrated shield connection (available for PROFIBUS PA)	7ML1930-1AQ
Probe LU, rock guard/sunshield kit, 304 stainless steel	7ML1930-1GH
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch see point level measurement section.	
Spare Parts	
Plastic lid	7ML1830-1KB

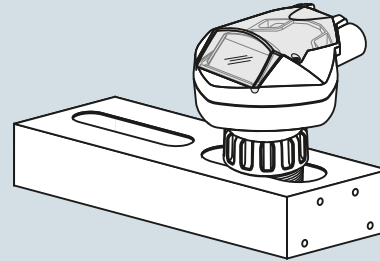
Options

Flange adapter for mating 2" NPT or 2" BSP process connections to 3" ASME, DN 65 PN 10 and JIS 10K 3B flanges



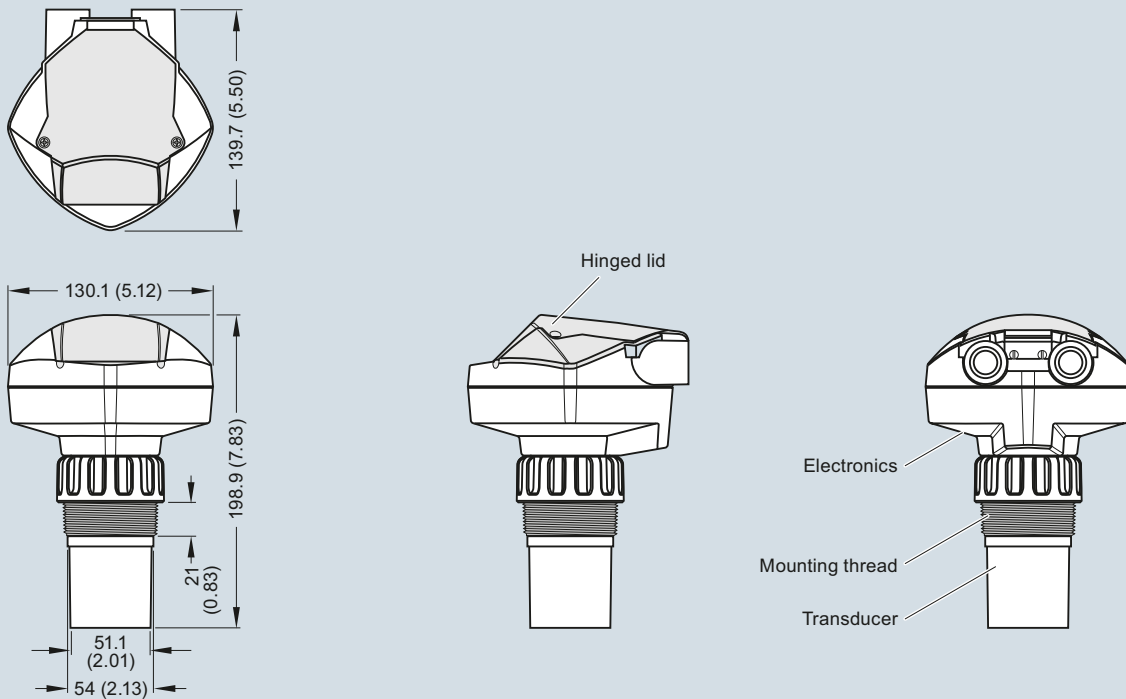
SITRANS Probe LU optional flange adapter, dimensions in mm (inch)

SITRANS Probe LU with FMS 200 mounting bracket



SITRANS Probe LU with optional mounting bracket

Dimensional drawings



Note: Above model is shown without M20 cable glands or 1/2" NPT conduit connectors.

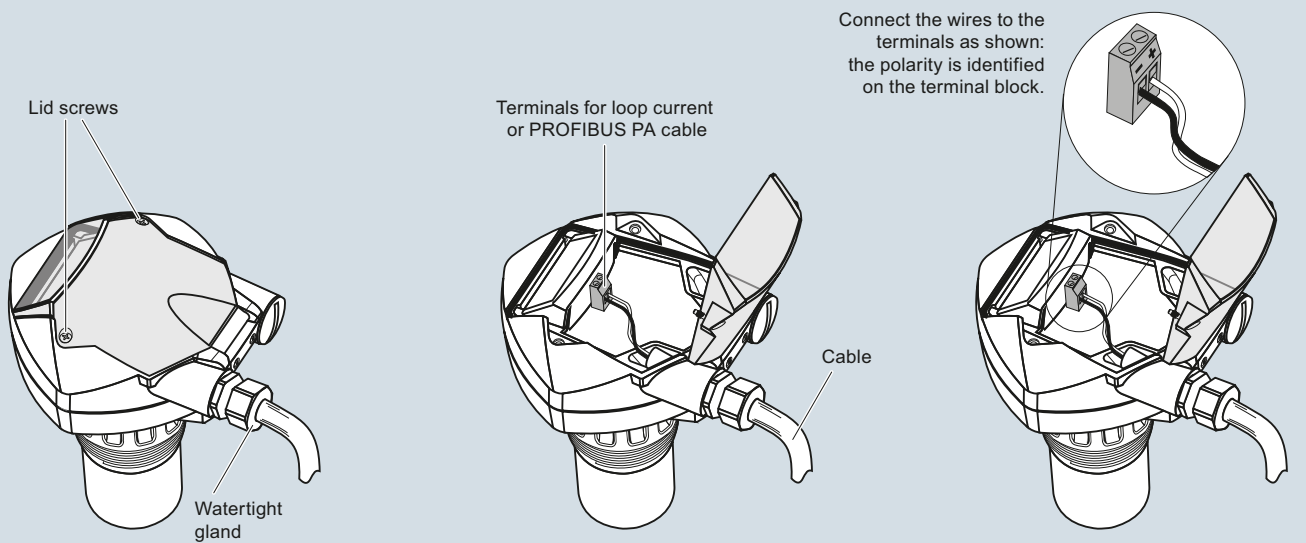
SITRANS Probe LU, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Ultrasonic transmitters

SITRANS Probe LU

Schematics



Note:

- HART model above is shown with M20 cable glands. 1/2" NPT threaded connection is also available.
- DC terminal shall be supplied from an SELV source in accordance with IEC-1010-1 Annex H.
- All field wiring must have insulation suitable for rated input voltages.
- Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

SITRANS Probe LU connections

Overview



The Probe is a short-range integrated ultrasonic level transmitter, ideal for liquids and slurries in open or closed vessels.

Benefits

- Easy to install, program and maintain
- Accurate and reliable
- Sanitary models available
- Patented Sonic Intelligence echo processing
- Integral temperature compensation

Application

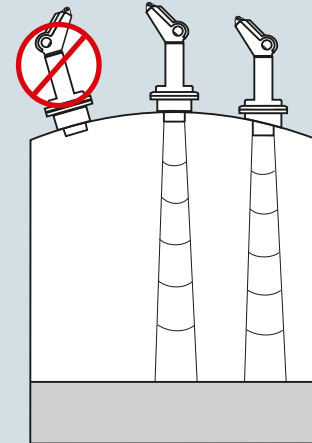
The transducer is available in PVDF copolymer, making the device suitable for use in a wide variety of applications. The Probe is easy to install and maintain, and can be quickly removed for cleaning as required by the food, beverage and pharmaceutical industries.

The reliability of the level data is based on the Sonic Intelligence echo processing algorithms. A filter discriminates between the true echo and false echoes from acoustic or electrical noises and agitator blades in motion. The ultrasonic pulse propagation time to the material and back is temperature-compensated and converted into distance for display, analog output and relay actuation.

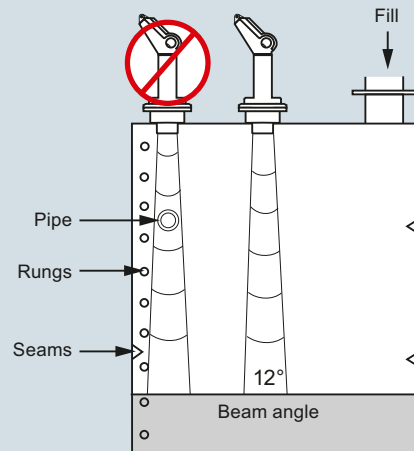
- Key Applications: chemical storage vessels, filter beds, mud pits, liquid storage vessels, food applications

Configuration

Parabolic mounting



Flat mounting and beam angle



The Probe mounting

Level Measurement

Continuous level measurement – Ultrasonic transmitters

The Probe

Technical specifications

	Three-wire version	Two-wire version (standard)
Mode of operation		
Measuring principle	Ultrasonic level measurement	Ultrasonic level measurement
Input		
Measuring range	0.25 ... 5 m (0.8 ... 16.4 ft)	0.25 ... 5 m (0.8 ... 16.4 ft)
Frequency	54 kHz	54 kHz
Output		
• mA	4 ... 20 mA	4 ... 20 mA
- Span	Proportional/ inversely proportional	Proportional/ inversely proportional
- Max. load	750 Ω at 24 V DC	600 Ω in the loop at 24 V DC
• Relay	For level alarm or fault	No
Power supply		
Supply voltage	18 ... 30 V DC, max. 0.2 A	12 ... 30 V DC, 0.1 A surge
Max. power consumption	5 W (200 mA at 24 V DC)	0.75 W (25 mA at 24 V DC)
Certificates and approvals		
	CE, RCM, CSA _{US/C} , FM	CE, RCM, CSA _{US/C}
Accuracy		
• Error in measurement	0.25 % of measuring range (in air)	
• Resolution	3 mm (0.125 inch)	
• Temperature compensation	Built in	
• Echo processing	Sonic Intelligence	
Rated operation conditions		
• Beam angle	12°	
• Ambient temperature		
- Standard	-40 ... +60 °C (-40 ... +140 °F)	
- Metallic mounting	-20 ... +60 °C (-4 ... +140 °F)	
• Max. static operating pressure	Normal atmospheric pressure	
• Degree of protection	IP65	
Design		
• Weight		
- Without flange adapter	1.5 kg (3.3 lb)	
- With flange adapter	1.7 kg (3.7 lb)	
• Material		
- Electronics enclosure	PVC	
- Transducer	PVDF copolymer	
• Degree of protection	IP65	
• Process connection	2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]	
• Flange adapter	3" Universal, (fits DN 65, PN 10 and 3"ASME) 4" sanitary	
• Cable inlet	2 inlets for PG 16 or ½" NPT cable glands	

Selection and Ordering data

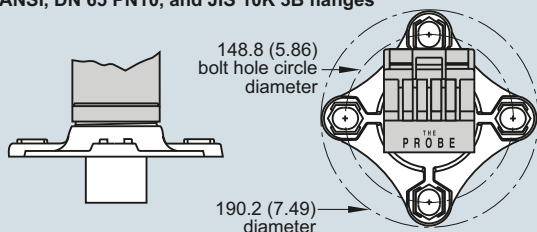
	Article No.
The Probe	7ML1201-
Short-range integrated ultrasonic level transmitter, ideal for liquids and slurries in open or closed vessels	00
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring range	1
5 m (16.40 ft)	
Transducer/Process connection	E
PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1]	
PVDF copolymer, R 2" [(BSPT), EN 10226]	F
PVDF copolymer, G 2" [(BSPP), EN ISO 228-1]	G
PVDF copolymer, 4" Sanitary mounting	J
Model/Approval	E
3 Wire, 24 V DC, CE, RCM, CSA, FM	
2 Wire, 24 V DC, CE, RCM, CSA	F
• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ➤. For details see page 9/5 in the appendix.	

Selection and Ordering data

	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 20 characters) specify in plain text	Y17
Additional Operating Instructions	Article No.
3 Wire, 24 V model, Multi-language manual	7ML1998-5GD62
2 Wire model, Multi-language manual	A5E32243983
Accessories	
Universal Box Bracket Mounting kit	7ML1830-1BK
Sanitary 4" mounting clamp	7ML1830-1BR
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" NPT	7ML1830-1BT
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" BSPT	7ML1830-1BU
2" NPT locknut, plastic	7ML1830-1DT
2" BSPT locknut, plastic	7ML1830-1DQ
Plastic M20 cable gland with metal locknut	7ML1930-1DB
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch see point level measurement section.	
• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ➤. For details see page 9/5 in the appendix.	

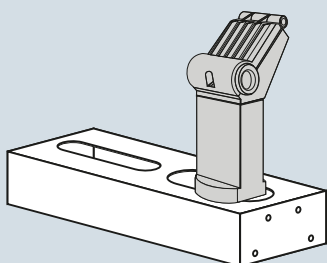
Options

Flange adapter for mating 2" NPT or 2" BSP process connections to 3" ANSI, DN 65 PN10, and JIS 10K 3B flanges



The Probe Optional Flange Adapter, dimensions in mm (inch)

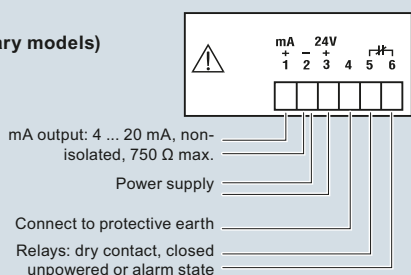
The Probe with FMS 200 mounting bracket



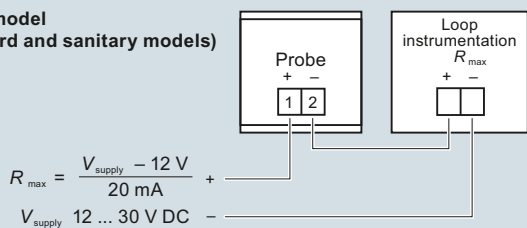
The Probe with Optional Mounting Bracket

Schematics

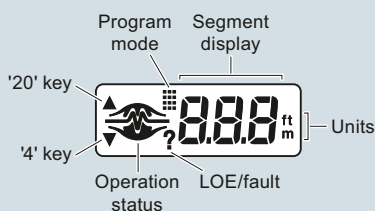
3 wire model (standard and sanitary models)



2 wire model (standard and sanitary models)



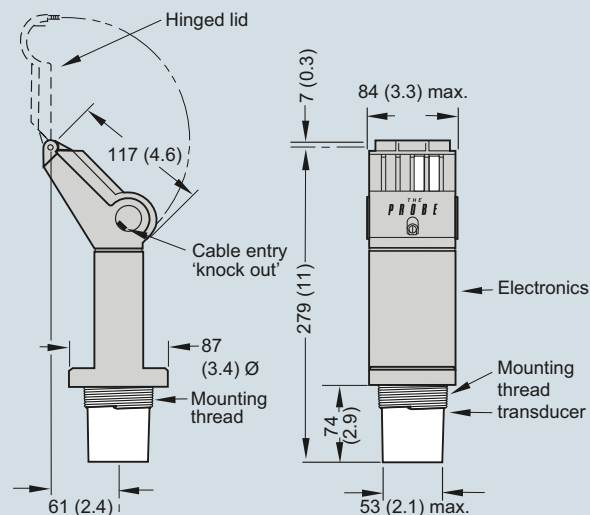
Display



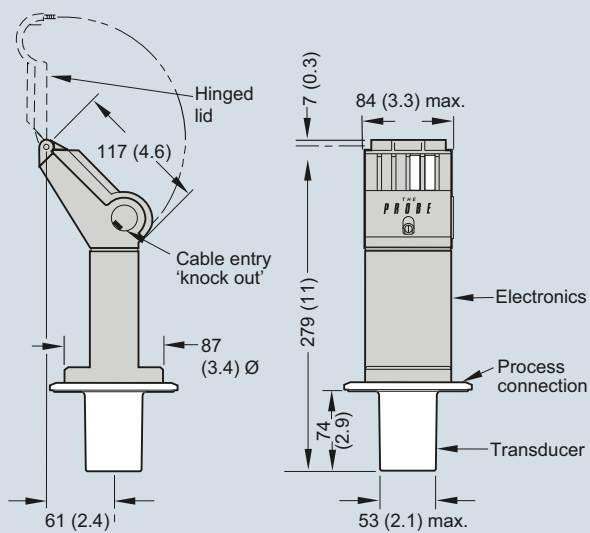
The Probe connections

Dimensional drawings

Standard model



Sanitary model



The Probe, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series

Overview



The Siemens SITRANS LUT400 series controllers are compact, single point, long-range ultrasonic controllers for continuous level or volume measurement of liquids, slurries, and solids, and high accuracy monitoring of open channel flow.

Benefits

- Small 1/2 DIN enclosure [144 h x 144 d x 146 w mm (5.7 x 5.7 x 5.75 inch)] with standard universal mounting bracket for wall, pipe, and DIN rail, plus an optional panel mount
- Easy to use HMI display with local four-button programming, menu-driven parameters, and Wizard support for key applications
- English, German, French, Spanish, Chinese, Italian, Portuguese, and Russian texts on the HMI.
- Level, Volume, OCM Flow monitoring
- Three relays combined with a suite of pump, alarm, and relay control features
- HART Communications
- EDDs for SIMATIC PDM, AMS Device Manager, and Field Communicator 375/475, plus DTMs for FDTs (Field Device Tools)
- Web browser for local programming from an intuitive web-based interface
- Two discrete inputs for backup level override and pump interlock functions
- Echo profile and trend views from the local display
- Patented digital receiver for improved performance in electrically noisy applications (close proximity to VSDs)
- Real time clock with daylight savings time, supporting an integrated datalogger and energy saving algorithms for minimizing pump operation during high cost energy periods
- Removable terminal blocks for ease of wiring
- MCERTS Certified for Open Channel Flow

Application

The SITRANS LUT400 comes in three different models, depending on the application, level of performance and functionality required:

- SITRANS LUT420 Level Controller: Level or volume measurement of liquids, slurries, and solids, as well as basic pump control functions, and basic data logging capability
- SITRANS LUT430 Level, Pump and Flow Controller: Includes all features of the LUT420 plus a full suite of advanced pump control and alarm functionality, open channel flow monitoring, and basic flow data logging capability
- SITRANS LUT440 High Accuracy OCM: Our most featured, highest accuracy model. Includes all features of the LUT430, plus the industry's best accuracy (± 1 mm within 3 m), full suite of advanced control functionality, and enhanced flow logging capability
- Key applications: wet wells, reservoirs, flumes/weirs, chemical storage, liquid storage, hoppers, crusher bins, dry solids storage

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series

Technical specifications

Mode of Operation	Ultrasonic level, volume, pump, and open channel flow	
Measuring range	0.3 ... 60 m (1 ... 196 ft), transducer dependent	
Input	0 ... 50 V DC switching level Logical 0 ≤ 10 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA	
Output		
Transducer frequency	10 ... 52 kHz	
Ultrasonic transducer	Compatible transducers: All Echo-Max and ST-H series transducers	
Relays	<ul style="list-style-type: none"> • 1 SPDT Form C, NO or NC relay, rated 1A at 250 V AC, non-inductive and 3A at 30 V DC • 2 SPST Form A, NO relays, rated 5A at 250 V AC, non-inductive and 3 A at 30 V DC 	
mA output	4 ... 20 mA, isolated	
• Max. load	600 Ω max. in ACTIVE mode, 750 Ω max. in PASSIVE mode	
• Resolution	0.1 % of range	
Accuracy		
Error in measurement	<ul style="list-style-type: none"> • Standard operation: ± 1 mm (0.04 inch) plus 0.17 % of measured distance • High accuracy OCM: ± 1 mm (0.04 inch), within 3 m (9.84 ft) range 	
Resolution	<ul style="list-style-type: none"> • Standard operation: 0.1 % of range or 2 mm (0.08 inch), whichever is greater • High accuracy OCM: 0.6 mm (0.02 inch), within 3 m (9.84 ft) range 	
Temperature compensation	<ul style="list-style-type: none"> • -40 ... +150 °C (-40 ... +300 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values 	
Rated operating conditions		
Installation conditions	Indoor/outdoor	
• Location	II	
• Installation category	4	
• Pollution degree		
Ambient conditions		
• Ambient temperature (enclosure)	-20 ... +50 °C (-4 ... +122 °F)	
Design		
Weight	1.3 kg (2.87 lb)	
• Enclosure with display lid	1.2 kg (2.65 lb)	
• Enclosure with blank lid:		
Material (enclosure)	Polycarbonate	
Degree of protection	IP65/Type 4X/NEMA 4X	
• Enclosure with display or blank lid:	IP20	
• Enclosure with blank lid and knock-out removed:		
Remote display lid:	IP65/Type 3/NEMA 3	
Cable		
Transducer and mA output signal	<ul style="list-style-type: none"> • Transducer, mA output: 2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm² (22 ... 18 AWG) • Relay/power to be copper conductors per local requirements to meet 250 V 5 A contact rating 	
Max. separation between transducer and transceiver	365 m (1 200 ft)	
Displays and controls	60 x 40 mm (2.36 x 1.57 inch) removable LCD, 240 x 160 pixels resolution, operational up to 5 m from enclosure base	
Programming	4 Local push buttons	
• Primary	<ul style="list-style-type: none"> • PC running SIMATIC PDM • PC running Emerson AMS Device Manager • PC running a web browser • PC running a Field Device Tool (FDT) • Field Communicator 375/475 (FC375/FC475) 	
• Secondary		
Memory	<ul style="list-style-type: none"> • 512 kB flash EPROM • 1.5 MByte flash for data logging 	
Power supply		
AC version	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA Fuse: 5 x 20 mm, Slow Blow, 0.25 A, 250 V	
DC version	10 ... 32 V DC, 10 W Fuse: 5 x 20 mm, Slow Blow, 1.6 A, 125 V	
Certificates and approvals		
General	CSA _{US/CA} , CE, FM, UL listed, RCM, MCERTS certified for Open Channel Flow	
Hazardous	<ul style="list-style-type: none"> • Non-incendive (Canada) 	
• Shipping	CSA Class I, Div. 2, Groups A, B, C, D; Class II, Div. 2, Groups F, G; Class III Lloyd's Register, ABS	
Communication	HART 7.0, USB	

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series

Category	Feature	SITRANS LUT420 Level Controller	SITRANS LUT430 Level, pump and flow controller	SITRANS LUT440 High accuracy OCM controller
Operations	Level, space, and distance measurement	✓	✓	✓
	Open channel flow measurement		✓	✓
	Volume conversion	✓	✓	✓
Specifications	Compatible with EchoMax and ST-H transducers	✓	✓	✓
	Standard accuracy: ± 1 mm +0.17 % of measured distance	✓	✓	✓
	High accuracy: ± 1 mm within 3 meters			✓
	Mounting options: wall or panel, pipe, DIN-rail	✓	✓	✓
Data logging and communications	HART communications	✓	✓	✓
	4 ... 20 mA output (active and passive)	✓	✓	✓
	Integrated datalogger for measurement value and alarms	✓	✓	✓
	Integrated datalogger for fixed rate flow logging		✓	✓
	Integrated datalogger for variable rate flow logging triggered by changes in flow condition			✓
	Daily data logging for maximum, minimum and average flow, daily totalized volume, and minimum and maximum temperature		✓	✓
Flow monitoring	High accuracy open channel flow measurement			✓
	9 digit daily and running flow totalizers		✓	✓
	High and low flowrate alarms		✓	✓
	External totalizer and sampler control		✓	✓
	MCERTS Class 1 Certification			✓
	MCERTS Class 2 Certification		✓	
Pump control	Energy saving algorithms for pump control		✓	✓
	Wall cling reduction	✓	✓	✓
	Pump run-on functionality		✓	✓
	Pump start and power resumption delays		✓	✓
	Alternate duty pump routines	✓	✓	✓
	Fixed duty and service ratio pump routines		✓	✓
	Pumped volume totalizer		✓	✓
	Submergence detection	✓	✓	✓
	Discrete input pump interlocks		✓	✓
Time to spill calculation		✓	✓	

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series

Selection and Ordering data	Article No.	Communications Manual	
SITRANS LUT420 and LUT430 Compact ultrasonic level controllers for continuous short to long-range level or volume measurement of liquids, slurries, and solids. Both units include basic relay functions for pumps, alarms, and other controls, plus onboard data logging. LUT430 offers additional advanced pump control and alarm functionality, open channel flow monitoring, and basic flow data logging capability. Functionality varies by model. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5050- 	English French Spanish German Italian Note: The communications manual should be ordered as a separate line item on the order.	7ML1998-5NE01 7ML1998-5NE11 7ML1998-5NE21 7ML1998-5NE31 7ML1998-5NE51
Model SITRANS LUT420 - Level controller ● A SITRANS LUT430 - Level, Pump & Flow controller ● B		Accessories Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure 7ML1930-1AC TS-3 Temperature Sensor - see TS-3 on page 4/189 7ML1813-... Panel mount cable extension, 2.5 m (8.2 ft) 7ML1930-1GF Qty 3 cable glands and retaining nuts 7ML1930-1GB USB cable, 2 m (6.56 ft) - Standard USB-A to USB-mini B 7ML1930-1GD Hart modem/USB (for use with a PC and SIMATIC PDM) 7MF4997-1DB Sunshield, 304 stainless steel 7ML1930-1GE SITRANS RD100, loop powered display - see Chapter 7 7ML5741-... SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 7ML5740-... SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 7ML5744-... SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7 7ML5750-...	
Enclosure display options With display ● A With remote panel mount display [Includes panel mount cable extension, 2.5 m (8.2 ft)] ● B No display (blank lid provided) ● C Note: Enclosure includes back-plate for wall and pipe mounting, and an integrated clip for DIN-rail mounting. DIN-rail mounting for standard TS35 x 7.5 and TS35 x 15 mm DIN-rail to IEC 60715, EN 60715		SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	
Input voltage 100 ... 230 V AC ± 15 % ● 1 10 ... 32 V DC ● 2		Spare parts Panel mount retrofit kit (convert standard unit with display to panel mount version) 7ML1830-1PA Terminal block replacement kit (5 piece kit with one of each removable terminal) 7ML1830-1PB Wall/Pipe mount plate 7ML1830-1PC Enclosure (include blank label) 7ML1830-1PD SITRANS LUT400 Lid (with Display) 7ML1830-1PE SITRANS LUT400 Lid (blank) 7ML1830-1PF Fuse - AC (0.25 A, 250 V, Slow Blow) 7ML1830-1PG Fuse - DC (1.6 A, 125 V, Slow Blow) 7ML1830-1PH Battery BR2032 7ML1830-1PJ Panel mount gasket and fastener kit 7ML1830-1PK DIN-rail clip 7ML1830-1PL	
Cable inlet 3 cable inlets, cable glands not supplied ● 1 3 cable inlets, 3 M20 plastic cable glands supplied ● 2			
Number of measurement points Single point system (includes one transducer input, one mA output, and one external temperature sensor input) ● 1			
Communications and I/O HART, 2 discrete inputs, 3 relays ● D			
Approvals General purpose CE, FM, CSA _{US/C} , UL, RCM ● A Hazardous locations CSA Class I, II, III, Div. 2 (Groups A, B, C, D, F, G) ● C			
● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.			
Selection and Ordering data	Order code		
Further designs Please add "-Z" to Article No. and specify Order code(s).			
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000 ● C11			
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text ● Y15			
Namur NE43 failsafe setting - device preset to failsafe < 3.6 mA ● N07			
Operating Instructions	Article No.		
English	7ML1998-5MV01		
French	7ML1998-5MV11		
Spanish	7ML1998-5MV21		
German	7ML1998-5MV31		
Italian	7ML1998-5MV51		
Multi-language compact operating instructions Note: The operating instructions should be ordered as a separate line item on the order.	7ML1998-5XU81		
		● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series

Selection and Ordering data	Article No.
SITRANS LUT440 The SITRANS LUT440 is the most accurate and featured model in the LUT400 series. It includes high accuracy open channel monitoring, relay functions for external samplers, totalizers, alarms, and enhanced data logging, as well as all pump and control functions available with other models in the LUT400 series.	7ML5050-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Model SITRANS LUT440 - High accuracy Open Channel Monitor ¹⁾	C
Enclosure display options With display With remote panel mount display [Includes panel mount cable extension, 2.5 m (8.2 ft)] No display (blank lid provided) Note: Enclosure includes back-plate for wall and pipe mounting, and an integrated clip for DIN-rail mounting. DIN-rail mounting for standard TS35 x 7.5 and TS35 x 15 mm DIN-rail to IEC 60715, EN 60715	A B C
Input voltage 100 ... 230 V AC ± 15 % 10 ... 32 V DC	1 2
Cable inlet 3 cable inlets, cable glands not supplied 3 cable inlets, 3 M20 plastic cable glands supplied	1 2
Number of measurement points Single point system (includes one transducer input, one mA output, and one external temperature sensor input)	1
Communications and I/O HART, 2 discrete inputs, 3 relays	D
Approvals General purpose CE, FM, CSA _{US/C} , UL, RCM Hazardous locations CSA Class I, II, III, Div. 2, (Groups A, B, C, D, F, G)	A C

¹⁾ Compatible with all EchoMax Transducers. High accuracy OCM performance with the use of an XRS-5 transducer and TS-3 temperature sensor (each sold separately).

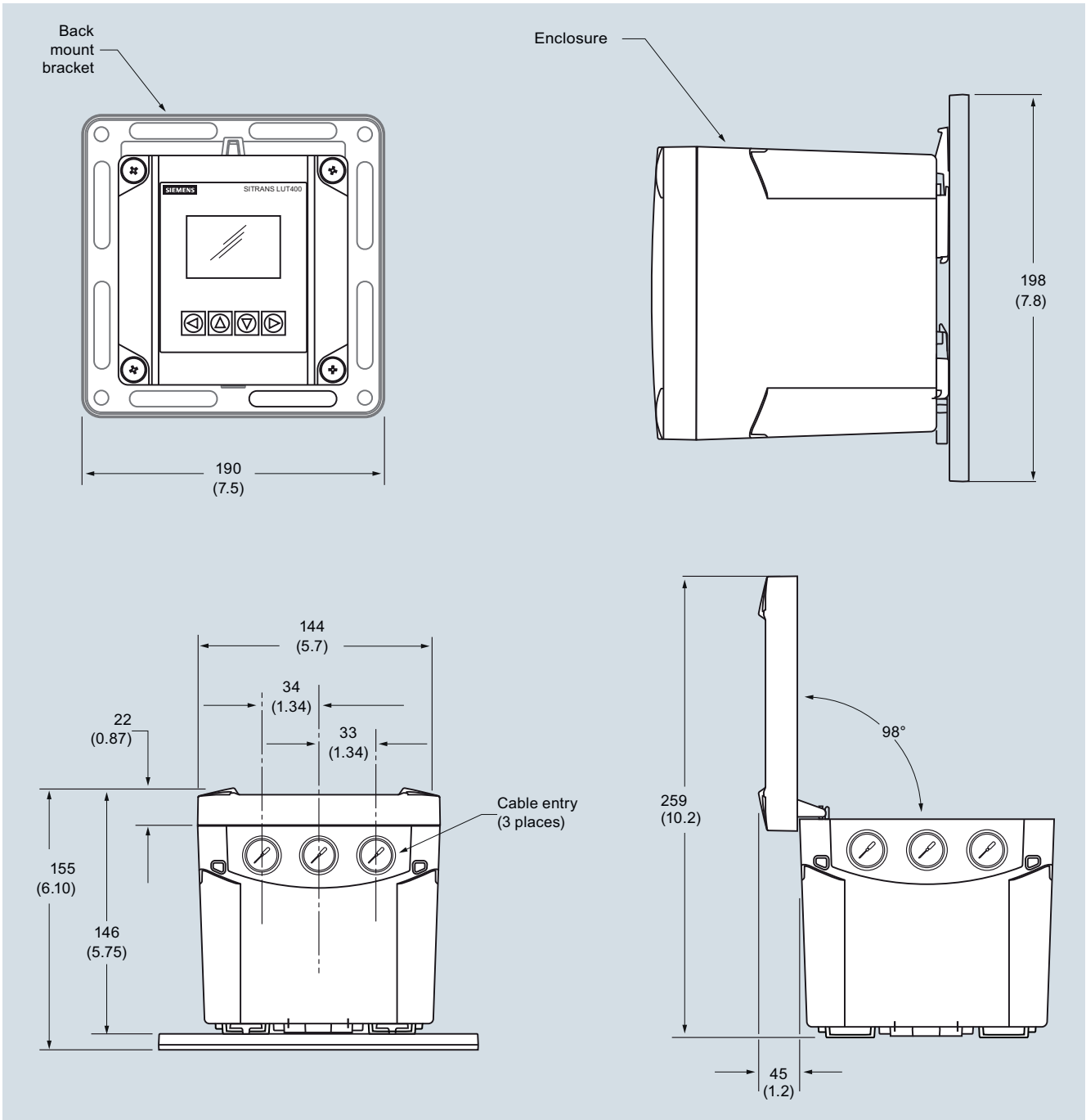
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add " -Z " to Article No. and specify Order code(s).	
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	◆ C11
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	◆ Y15
Namur NE43 failsafe setting - device preset to failsafe < 3.6 mA	◆ N07
Operating Instructions	Article No.
English	7ML1998-5MV01
French	7ML1998-5MV11
Spanish	7ML1998-5MV21
German	7ML1998-5MV31
Italian	7ML1998-5MV51
Note: The operating instructions should be ordered as a separate line item on the order.	

Communications Manual	
English	7ML1998-5NE01
French	7ML1998-5NE11
Spanish	7ML1998-5NE21
German	7ML1998-5NE31
Italian	7ML1998-5NE51
Note: The communications manual should be ordered as a separate line item on the order.	
Accessories Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure TS-3 Temperature Sensor - see TS-3 on page 4/189 Panel mount cable extension 2.5 m (8.2 ft) Qty 3 cable glands and retaining nuts USB cable 2 m (6.56 ft) - Standard USB-A to USB-mini B HART modem/USB (for use with PC and SIMATIC PDM) Sunshield, 304 stainless steel SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML1930-1AC 7ML1813-... 7ML1930-1GF 7ML1930-1GB 7ML1930-1GD 7MF4997-1DB 7ML1930-1GE 7ML5741-... 7ML5740-... 7ML5744-... 7ML5750-...
Spare parts Panel mount retrofit kit (convert standard unit with display to panel mount version) Terminal block replacement kit (5 piece kit with one of each removable terminal) Wall/Pipe mount plate Enclosure (include blank label) SITRANS LUT400 Lid (with Display) SITRANS LUT400 Lid (blank) Fuse - AC (0.25 A, 250 V, Slow Blow) Fuse - DC (1.6 A, 125 V, Slow Blow) Battery BR2032 Panel mount gasket and fastener kit DIN-rail clip	7ML1830-1PA 7ML1830-1PB 7ML1830-1PC 7ML1830-1PD 7ML1830-1PE 7ML1830-1PF 7ML1830-1PG 7ML1830-1PH 7ML1830-1PJ 7ML1830-1PK 7ML1830-1PL

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix

Dimensional drawings

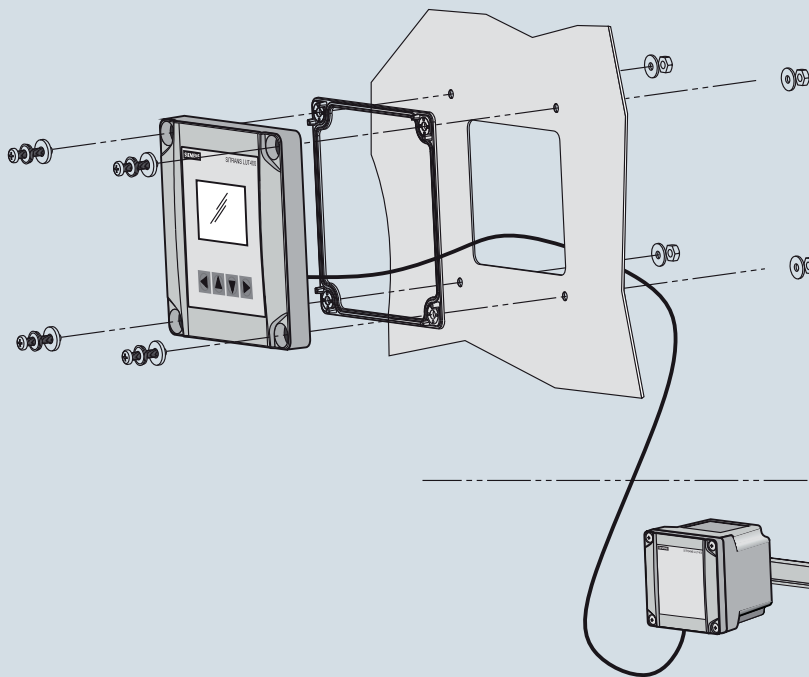
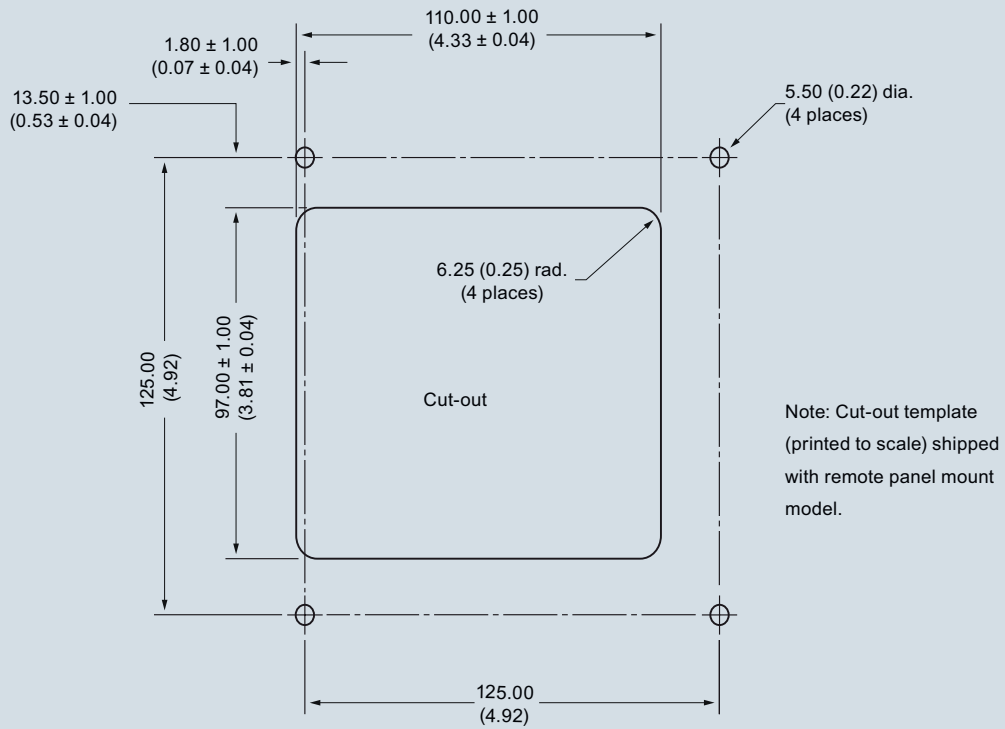


SITRANS LUT400, dimensions in mm (inch)

Level Measurement

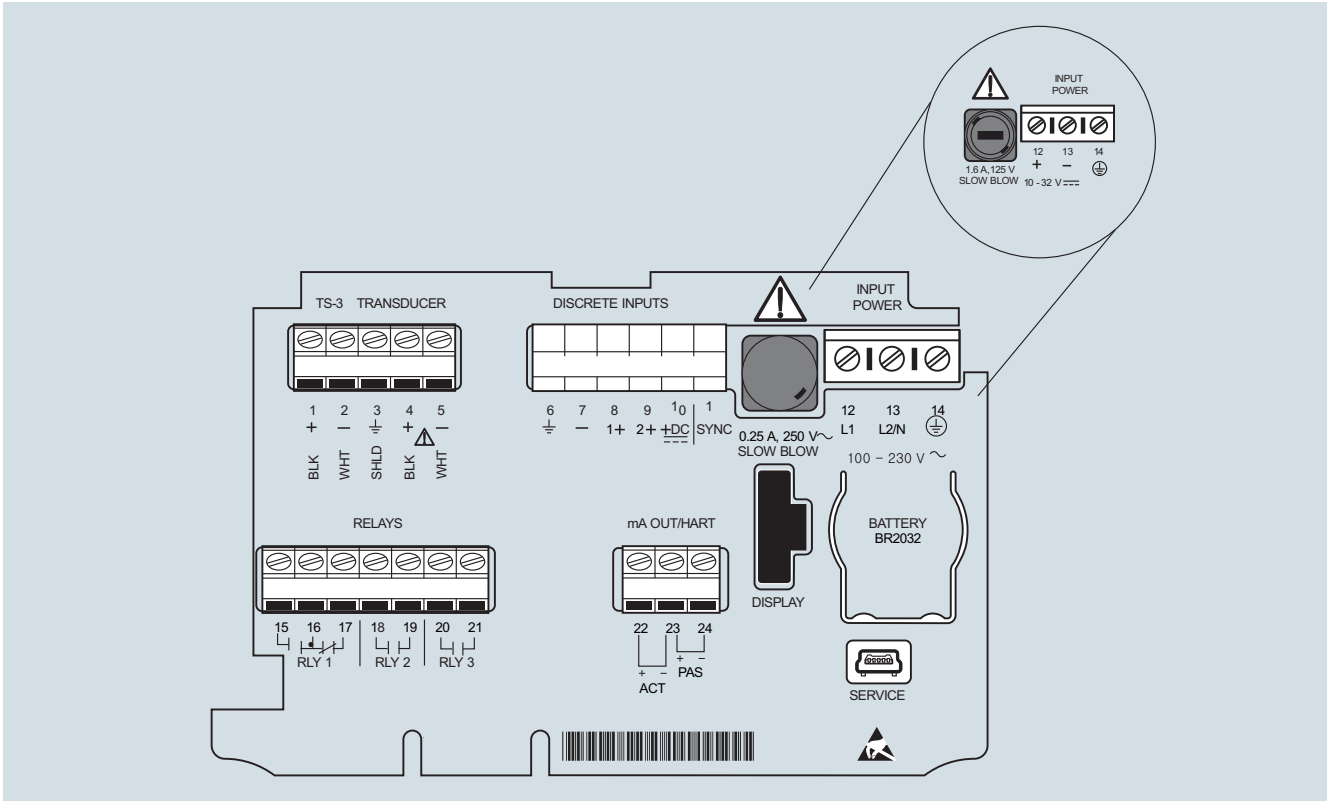
Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series



SITRANS LUT400, dimensions in mm (inch)

Schematics



SITRANS LUT400 connections

4

Level Measurement

Continuous level measurement – Ultrasonic controllers

MultiRanger 100/200

Overview



MultiRanger is a versatile short to medium-range ultrasonic single and multi-vessel level monitor/controller for virtually any application in a wide range of industries.

Benefits

- Digital input for back-up level override from point level device
- Communication using built-in Modbus RTU via RS-485
- Compatible with SmartLinx system and SIMATIC PDM configuration software
- Single or dual point level monitoring
- Auto False-Echo Suppression for fixed obstruction avoidance
- Differential amplifier transceiver for common mode noise reduction and improved signal-to-noise ratio
- MultiRanger 100: level measurements, simple pump control, and level alarm functions
- MultiRanger 200: level, volume and flow measurements in open channels, differential control, extended pump control, and alarm functions
- Wall and panel mounting options

Application

MultiRanger can be used on different materials, including fuel oil, municipal waste, acids, woodchips, or on materials with high angles of repose. MultiRanger offers true dual point monitoring, digital communications with built-in Modbus RTU via RS-485, as well as compatibility with SIMATIC PDM, allowing PC configuration and setup. MultiRanger features Sonic Intelligence advanced echo-processing software for increased reading reliability.

MultiRanger 100 offers cost-effective level alarming, as well as on/off and alternating pump control. MultiRanger 200 will monitor open channel flow and features more advanced relay alarming and pump control functions as well as volume conversion.

It is compatible with chemical-resistant EchoMax transducers that can be used in hostile environments at temperatures as high as 145 °C (293 °F).

- Key Applications: wet wells, flumes/weirs, bar screen control, hoppers, chemical storage, liquid storage, crusher bins, dry solids storage

Design

The MultiRanger is available in wall or panel mounting options.

Technical specifications

Mode of Operation		Design	
Measuring principle	Ultrasonic level measurement	Weight	
Measuring range	0.3 ... 15 m (1 ... 50 ft)	• Wall mount	1.37 kg (3.02 lb)
Measuring points	1 or 2	• Panel mount	1.50 kg (3.31 lb)
Input		Material (enclosure)	Polycarbonate
• Analog (MultiRanger 200 only)	0 ... 20 mA or 4 ... 20 mA, from alternate device, scalable	Degree of protection (enclosure)	
• Discrete	10 ... 50 V DC switching level Logical 0 ≤ 0.5 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA	• Wall mount	IP65/Type 4X/NEMA 4X
Output		• Panel mount	IP54/Type 3/NEMA 3
EchoMax transducer	44 kHz	Electrical connection	
Ultrasonic transducer	Compatible transducers: ST-H and EchoMax series XPS-10, XPS 15/15F, and XRS-5	• Transducer and mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm ² (22 ... 18 AWG), Belden 8760 or equivalent is acceptable 365 m (1 200 ft)
Relays	Rating 5 A at 250 V AC, non-inductive 1 SPST Form A	• Max. separation between transducer and transceiver	
• Version with 1 relay (MultiRanger 100 only)		Displays and controls	100 x 40 mm (4 x 1.5 inch) multi-block LCD with backlighting
• Version with 3 relays	2 SPST Form A/1 SPDT Form C	Programming	Programming using hand-held programmer, SIMATIC PDM or via PC with Dolphin Plus software
• Version with 6 relays	4 SPST Form A/2 SPDT Form C	Power supply	
mA output	0 ... 20 mA or 4 ... 20 mA	• AC version	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA (17 W)
• Max. load	750 Ω, isolated	• DC version	12 ... 30 V DC (20 W)
• Resolution	0.1 % of range	Certificates and approvals	<ul style="list-style-type: none"> • CE, RCM²⁾ • Lloyd's Register of Shipping • ABS Type Approval • FM, CSA_{US/C}, UL listed • CSA Class I, Div. 2, Groups A, B, C and D, Class II, Div.2, Groups F and G, Class III (wall mount only), ATEX II 3D
Accuracy		Communication	<ul style="list-style-type: none"> • RS 232 with Modbus RTU or ASCII via RJ-11 connector • RS 485 with Modbus RTU or ASCII via terminal strips • Optional: SmartLinX cards for <ul style="list-style-type: none"> - PROFIBUS DP - DeviceNet
Error in measurement	0.25 % of range or 6 mm (0.24 inch), whichever is greater		
Resolution	0.1 % of measuring range ¹⁾ or 2 mm (0.08 inch), whichever is greater		
Temperature compensation	<ul style="list-style-type: none"> • -50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor • External TS-3 temperature sensor (optional) • Programmable fixed temperature values 		
Rated operating conditions			
Installation conditions			
• Location	Indoor/outdoor		
• Installation category	II		
• Pollution degree	4		
Ambient conditions			
• Ambient temperature (housing)	-20 ... +50 °C (-4 ... +122 °F)		

¹⁾ Program range is defined as the empty distance to the face of the transducer plus any range extension

²⁾ EMC performance available on request

Level Measurement

Continuous level measurement – Ultrasonic controllers

MultiRanger 100/200

Selection and Ordering data	Article No.
MultiRanger 100/200 Versatile short to medium-range ultrasonic single and multi-vessel level monitor/controller for virtually any application in a wide range of industries ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5033-
Versions MultiRanger 100, level measurement only ● 1 MultiRanger 200, level, volume, flow and differential measurements ● 2	
Mounting, enclosure design Wall mount, standard enclosure ● A Wall mount, 4 entries, 4 M20 cable glands included ● B Panel mount (CE, CSA _{US/C} , FM, UL) ● C	
Power supply 100 ... 230 V AC ● A 12 ... 30 V DC ● B	
Number of measurement points Single point version ● 0 Dual point version ● 1	
Communication (SmartLinX) Without module ● 0 SmartLinX PROFIBUS DP module ● 2 SmartLinX DeviceNet module ● 3 See SmartLinX product on page 4/360 for more information.	
Output relays 3 relays (2 Form A, 1 Form C), 250 V AC ● 1 6 relays (4 Form A, 2 Form C), 250 V AC ● 2 1 relay (1 Form A), 250 V AC ● 3 (available on MultiRanger 100 model only)	
Approvals General Purpose CE, FM, CSA _{US/C} , UL listed, RCM ● A CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div. 2, Groups F and G; Class III ¹⁾ ● B ATEX II 3D ²⁾ ● C	

1) For wall mount applications only

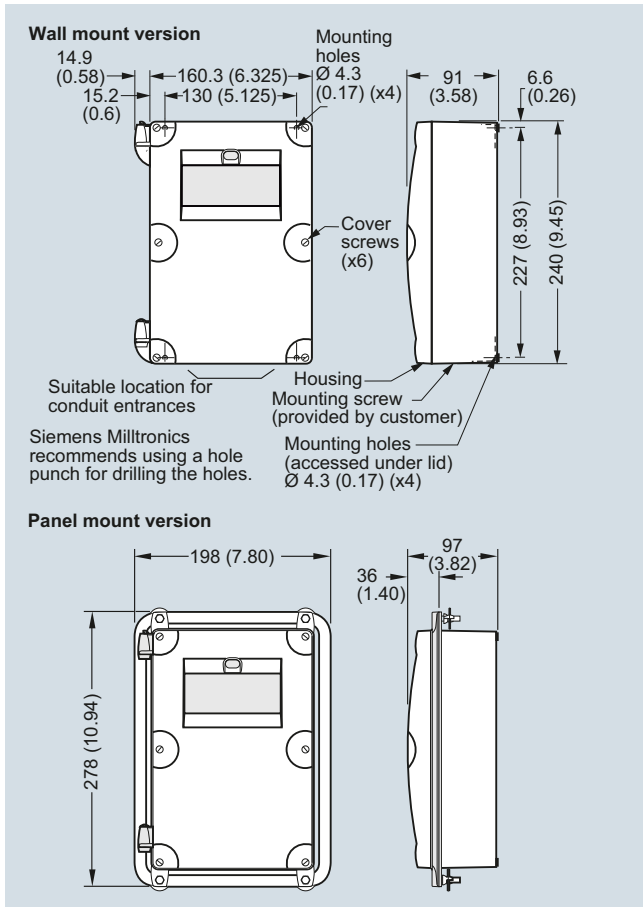
2) For standard enclosure wall mount, option A only

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: ● Y15 Measuring-point number/identification (max. 27 characters) specify in plain text	
Operating Instructions English French Spanish German Quick Start guide, multi-language Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5FB06 7ML1998-5FB13 7ML1998-5FB23 7ML1998-5FB36 7ML1998-5QD83
Other Operating Instructions SmartLinX PROFIBUS DP, English SmartLinX PROFIBUS DP, German SmartLinX PROFIBUS DP, French SmartLinX DeviceNet, English Note: The appropriate SmartLinX Operating Instructions should be ordered as a separate line on the order.	7ML1998-1AQ03 7ML1998-1AQ33 7ML1998-1AQ13 7ML1998-1BH02
Accessories Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure M20 cable gland kit (4 M20 cable glands, 4 M20 nuts, 4 washers) Sunshield kit, 304 stainless steel SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML1830-2AK 7ML1930-1AC 7ML1930-1FV 7ML1930-1GA 7ML5741-... 7ML5740-... 7ML5744-... 7ML5750-...
Spare parts Power Supply Board (100 ... 230 V AC) Power Supply Board (12 ... 30 V DC) Display Board	7ML1830-1MD 7ML1830-1ME 7ML1830-1MF

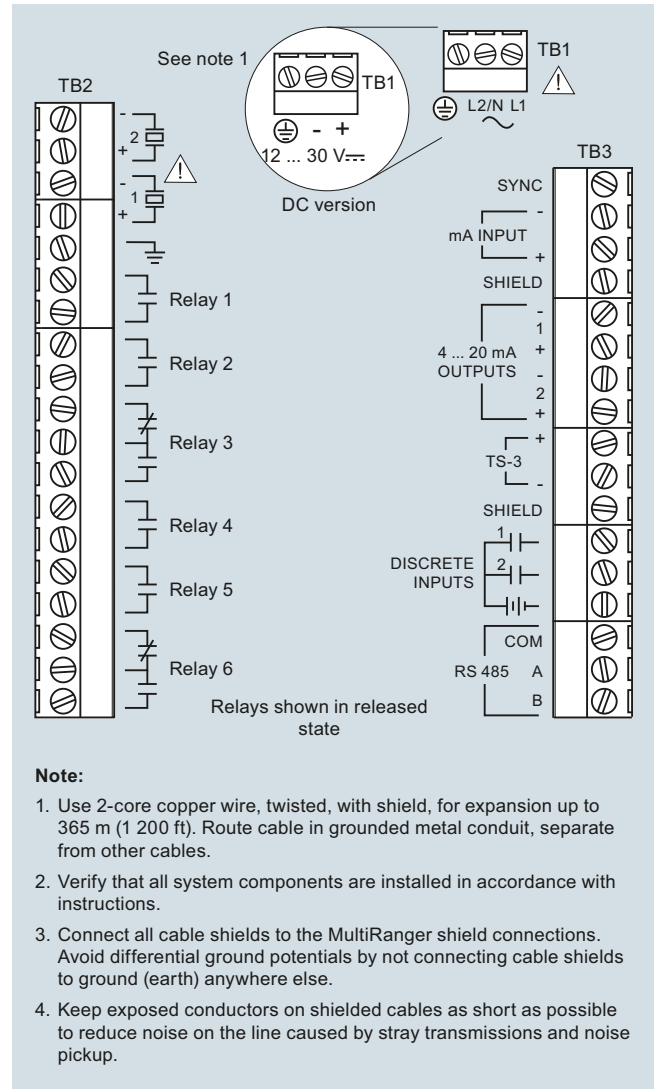
● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Dimensional drawings



MultiRanger, dimensions in mm (inch)

Schematics



MultiRanger connections

Level Measurement

Continuous level measurement – Ultrasonic controllers

HydroRanger 200

Overview



HydroRanger 200 is an ultrasonic level controller for up to six pumps and provides control, differential control, and open channel flow monitoring.

Benefits

- Monitors wet wells, weirs and flumes
- Digital communications with built-in Modbus RTU via RS-485
- Compatible with SmartLinX system and SIMATIC PDM configuration software
- Single or dual point level monitoring
- 6 relay (standard), 1 or 3 relay (optional)
- Auto False-Echo Suppression for fixed obstruction avoidance
- Anti-grease ring/tide mark buildup
- Differential amplifier transceiver for common mode noise rejection and improved signal-to-noise ratio
- Wall and panel mounting options

Application

For water authorities, municipal water, and wastewater plants, HydroRanger 200 is an economical, low-maintenance solution delivering control efficiency and productivity needed to meet today's exacting standards. It offers single point monitoring with all models, and optional dual-point monitoring with 6 relay model. As well, it has digital communications with built-in Modbus RTU via RS-485.

The standard 6 relay HydroRanger 200 will monitor open channel flow and features more advanced relay alarming and pump control functions as well as volume conversion. It is compatible with SIMATIC PDM, allowing for PC configuration and setup. Sonic Intelligence advanced echo-processing software provides increased reading reliability. The optional 1 or 3 relay models provide accurate level measurement functions only; these two models do not provide open channel flow, differential level measurement or volume conversion functions.

HydroRanger 200 uses proven continuous ultrasonic echo ranging technology to monitor water and wastewater of any consistency up to 15 m (50 ft) in depth. Achievable resolution is 0.1 % with accuracy to 0.25 % of range. Unlike contacting devices, HydroRanger 200 is immune to problems caused by suspended solids, harsh corrosives, grease or silt in the effluent, reducing downtime.

- Key Applications: wet wells, flumes/weirs, bar screen control

Technical specifications

Mode of Operation	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft), transducer dependent
Measuring points	1 or 2
Input	
Analog	0 ... 20 mA or 4 ... 20 mA, from alternate device, scalable (6 relay model)
Discrete	10 ... 50 V DC switching level Logical 0 ≤ 0.5 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA
Output	
EchoMax transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and EchoMax series XPS-10, XPS 15/15F, and XRS-5
Relays ¹⁾	Rating 5 A at 250 V AC, non-inductive
• Model with 1 relay ²⁾	1 SPST Form A
• Model with 3 relays ²⁾	2 SPST Form A/1 SPDT Form C
• Model with 6 relays	4 SPST Form A/2 SPDT Form C
mA output	0 ... 20 mA or 4 ... 20 mA
• Max. load	750 Ω, isolated
• Resolution	0.1 % of range
Accuracy	
Error in measurement	0.25 % of range or 6 mm (0.24 inch), whichever is greater
Resolution	0.1 % of measuring range or 2 mm (0.08 inch), whichever is greater ³⁾
Temperature compensation	<ul style="list-style-type: none"> • -50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values
Rated operating conditions	
Installation conditions	
• Location	Indoor / outdoor
• Installation category	II
• Pollution degree	4
Ambient conditions	
• Ambient temperature (enclosure)	-20 ... +50 °C (-4 ... +122 °F)

Design	
Weight	
• Wall mount	1.37 kg (3.02 lb)
• Panel mount	1.50 kg (3.31 lb)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3
Cable	
• Transducer and mA output signal	2-core copper conductor, twisted, shielded, 300 Vrms, 0.82 mm ² (18 AWG), Belden 8 760 or equivalent is acceptable
• Max. separation between transducer and transceiver	365 m (1 200 ft)
Displays and controls	
	100 x 40 mm (4 x 1.5 inch) multi-block LCD with backlighting
Programming	Programming using handheld programmer or via PC with SIMATIC PDM software
Power supply⁴⁾	
AC version	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA (17 W)
DC version	12 ... 30 V DC (20 W)
Certificates and approvals	
	<ul style="list-style-type: none"> • CE, RCM⁵⁾ • Lloyd's Register of Shipping • ABS Type Approval • FM, CSA_{US/C}, UL listed • CSA_{US/C} Class I, Div. 2, Groups A, B, C and D, Class II, Div. 2, Groups F and G, Class III (wall mount only) • MCERTS Class 3 approved for Open Channel Flow
Communication	
	<ul style="list-style-type: none"> • RS 232 with Modbus RTU or ASCII via RJ-11 connector • RS 485 with Modbus RTU or ASCII via terminal blocks • Optional: SmartLinx cards for <ul style="list-style-type: none"> - PROFIBUS DP - DeviceNet

¹⁾ All relays certified for use with equipment that fails in a state at or under the rated maximums of the relays

²⁾ This model is level control only; no open channel flow, differential level or volume conversion functions

³⁾ Program range is defined as the empty distance to the face of the transducer plus any range extension

⁴⁾ Maximum power consumption is listed

⁵⁾ EMC performance available upon request

Level Measurement

Continuous level measurement – Ultrasonic controllers

HydroRanger 200

Selection and Ordering data

Siemens HydroRanger 200

Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from number of measurement points options below.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Mounting

Wall mount, standard enclosure
Wall mount, 4 entries, 4 M20 cable glands included
Panel mount¹⁾

Power supply

100 ... 230 V AC
12 ... 30 V DC

Number of measurement points

Single point model, 6 relays
Dual point model, 6 relays
Single point model, level only, 1 relay²⁾
Single point model, level only, 3 relays²⁾

Communication (SmartLinX)

Without module
SmartLinX PROFIBUS DP module
SmartLinX DeviceNet module
See SmartLinX product on page 4/360 for more information.

Approvals

General Purpose CE, FM, CSA_{US/IC}, UL listed, RCM
CSA Class I, Div. 2, Groups A, B, C, and D;
Class II, Div. 2, Groups F and G; Class III
(for wall mount applications only)

¹⁾ Available with approval option 1 only

²⁾ This model is level control only; no open channel flow, differential level, or volume conversion functions.

Article No.

7ML5034-

1	A
2	B
3	C
	D
	0
	2
	3
1	
2	

Selection and Ordering data

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification
(max. 27 characters) specify in plain text

Order code

Y15

Operating Instructions

English

French

German

Note: The Operating Instructions should be ordered as a separate item on the order.
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Article No.

7ML1998-5FC03

7ML1998-5FC11

7ML1998-5FC33

Other Operating Instructions

SmartLinX PROFIBUS DP, English

SmartLinX PROFIBUS DP, German

SmartLinX PROFIBUS DP, French

SmartLinX DeviceNet, English

Note: The appropriate SmartLinX Operating Instructions should be ordered as a separate line on the order.

7ML1998-1AQ03

7ML1998-1AQ33

7ML1998-1AQ13

7ML1998-1BH02

Accessories

Handheld programmer

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure

Sunshield kit, 304 stainless steel

SITRANS RD100, loop powered display - see Chapter 7

SITRANS RD200, universal input display with Modbus conversion - see Chapter 7

SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7

SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7

7ML1830-2AK

7ML1930-1AC

7ML1930-1GA

7ML5741-...

7ML5740-...

7ML5744-...

7ML5750-...

Spare parts

Power Supply Board (100 ... 230 V AC)

Power Supply Board (12 ... 30 V DC)

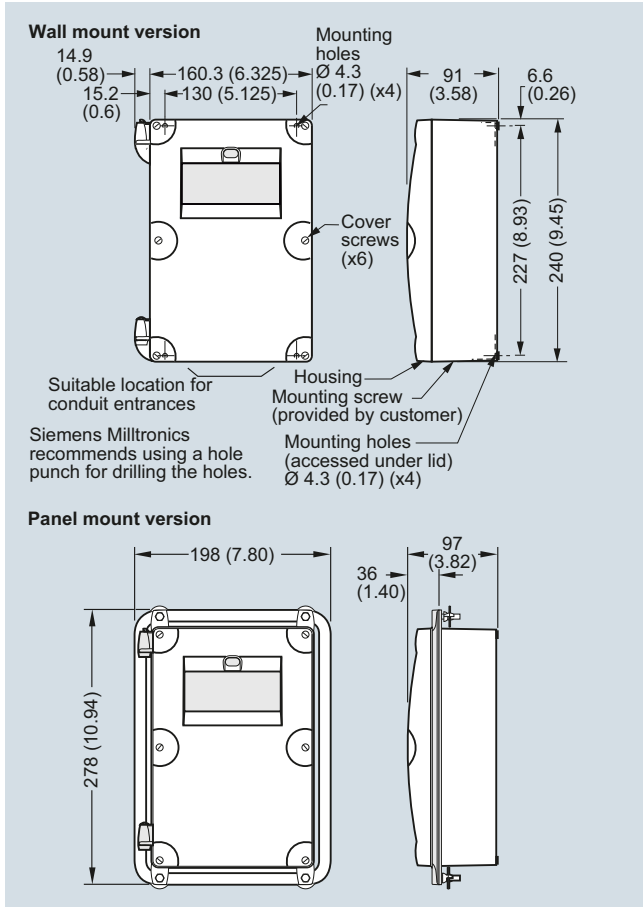
Display Board

7ML1830-1MD

7ML1830-1ME

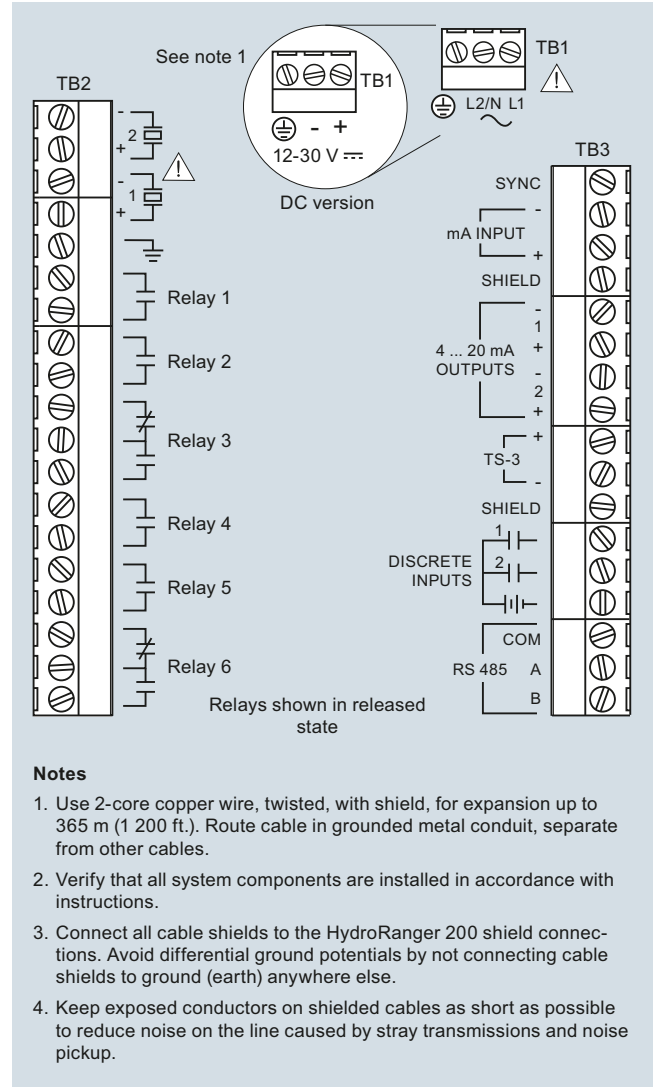
7ML1830-1MF

Dimensional drawings



HydroRanger 200, dimensions in mm (inch)

Schematics



Notes

1. Use 2-core copper wire, twisted, with shield, for expansion up to 365 m (1 200 ft.). Route cable in grounded metal conduit, separate from other cables.
2. Verify that all system components are installed in accordance with instructions.
3. Connect all cable shields to the HydroRanger 200 shield connections. Avoid differential ground potentials by not connecting cable shields to ground (earth) anywhere else.
4. Keep exposed conductors on shielded cables as short as possible to reduce noise on the line caused by stray transmissions and noise pickup.

HydroRanger 200 connections

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU01 and LU02

Overview



The SITRANS LU01 is an ultrasonic long-range level controller for liquids and solids in a single vessel up to 60 m (200 ft). Handheld programmer shown is an accessory and must be ordered separately.

Benefits

- Single point, long-range level monitoring
- Easy to install; easy to program using removable infrared keypad (optional)
- Compatible with all EchoMax transducers
- Backlit LCD display with reading in standard engineering units
- Automatic level-to-volume conversion for standard or custom tank shapes
- Dolphin Plus compatible
- High/low alarms

Application

The system consists of a SITRANS LU01 monitor linked to a non-contacting ultrasonic transducer that can be mounted up to 365 m (1 200 ft) away. The SITRANS LU01 will measure distance, level or volume, and it features patented Sonic Intelligence echo processing software for superior reliability.

Readings are displayed in user-selectable linear engineering units on the backlit LCD.

Modules for popular industrial buses can be factory installed or added later to meet changing needs. No external gateway is required, reducing hardware and cabling costs.

- Key Applications: chemical storage, liquid storage, bulk solids storage (gravel, flour bins, grains, cereals), plastic pellets

Overview



The SITRANS LU02 is a dual point ultrasonic long-range level controller for liquids and solids in one or two vessels up to 60 m (200 ft). Handheld programmer shown is an accessory and must be ordered separately.

Benefits

- Dual point, long-range level monitoring
- Easy to install; easy to program using removable infrared keypad (optional)
- Compatible with all EchoMax transducers
- Backlit LCD display with reading in standard engineering units
- Automatic level-to-volume conversion for standard or custom tank shapes
- Dolphin Plus compatible
- High/low alarms

Application

SITRANS LU02 will measure liquids, solids or a combination of both in one or two vessels of different sizes, shapes and configurations up to 60 m (200 ft).

The system uses ultrasonic technology to measure level, space, distance, volume or average/differential. It features patented Sonic Intelligence echo processing software for superior reliability. Transducers can be mounted up to 365 m (1 200 ft) from the monitor.

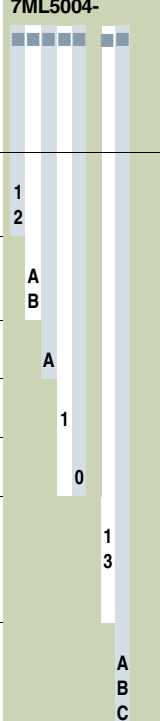
Readings are displayed in user-selectable linear engineering units on the backlit LCD.

- Key Applications: chemical storage, liquid storage, bulk solids storage (gravel, flour bins, grains, cereals), plastic pellets, tripper car

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU01 and LU02

Technical specifications		Selection and Ordering data	Article No.
Mode of operation		SITRANS LU01/LU02	7ML5004-
Measuring principle	Ultrasonic level measurement	Single or dual point ultrasonic long-range level monitoring system for liquids and solids, and ranges up to 60 m (200 ft).	
Measuring range	0.3 ... 60 m (1 ... 200 ft)	Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Measuring points	SITRANS LU01: Max. one point; SITRANS LU02 Max. two points		
Output signal		Number of measuring points	
Ultrasonic transducer	EchoMax series, ST-H transducers	LU01 version, 1 point LU02 version, 2 points	1 2
Relays	4 SPDT Form C relays, rated at 5 A at 250 V AC, resistive load		
mA output	0/4 ... 20 mA, optically isolated	Input voltage	
• Max. load	750 Ω, isolated, 30 V	100/115/200/230 V AC, voltage selector switch 18 ... 30 V DC	A B
• Resolution	0.1 % of range	Feature software	A
• Outputs	SITRANS LU01: Max. one mA output SITRANS LU02: Max. two mA outputs	Standard	1 0
Accuracy		Application software	
Error in measurement	0.25 % of range or 6 mm (0.24 inch), whichever is greater	Standard	
Resolution	0.1 % of measuring range or 2 mm (0.08 inch), whichever is greater	Data communications	
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor • External TS-3 temperature sensor (optional) • Programmable fixed temperature	No module (SmartLinX ready)	
Rated operating conditions		Enclosure	
Ambient conditions		Wall mount	1 3
Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)	Wall mount, drilled, 6 x M20 Note: Cable glands are not included and should be ordered as a separate line on the order.	
Design		Approvals	
Weight	2.7 kg (6 lb)	CE, CSA _{US/C} , FM ¹⁾	A B C
Material (enclosure)	Polycarbonate	CE	
Degree of protection (wall mount)	IP65	ATEX II 3D ²⁾	
Electrical connection			
Ultrasonic transducer cable extension	RG62-A/U coaxial cable with low capacitance		
mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm ² (22 ... 18 AWG), Belden 8 760 or equivalent is acceptable		
Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V		
Synchronization	5 A Up to 16 LU01/LU02 units can be synchronized together		
Power supply			
AC model	100/115/200/230 V AC ± 15 %, 50/60 Hz, 31 VA		
DC model	18 ... 30 V DC, 25 W		
Displays and controls			
Memory	51 x 127 mm (2 x 5 inch) graphics LCD with backlighting		
Programming	EEPROM (non-volatile), no backup battery required		
	Using removable programmer (ordered separately) or Dolphin Plus (option)		
Certificates and approvals			
	CE, CSA _{US/C} , FM, ATEX II 3D Lloyd's register of Shipping (Categories ENV1, ENV2, ENV3 and ENV5)		
Options			
External temperature sensor	TS-3		
Communications	• Dolphin Plus: Siemens Windows-compatible interface and ComVerter link (infrared)		

¹⁾ Available with enclosure option 1 only

²⁾ Available with enclosure option 3 only

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU01 and LU02

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification
(max. 27 characters) specify in plain text

Y15

Operating Instructions

SITRANS LU01

English

French

German

SITRANS LU02

English

French

German

Note: The Operating Instructions should be ordered as a separate line item.

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Selection and Ordering data

Article No.

Accessories

Handheld programmer

7ML1830-2AN

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosures

7ML1930-1AC

M20 cable gland kit (6 M20 cable glands, 6 M20 nuts, 3 stop plugs)

7ML1830-1GM

M20 cable gland kit (4 M20 cable glands, 4 M20 nuts, 4 washers)

7ML1930-1FV

TS-3 Temperature Sensor - see TS-3 on page 4/189

7ML1830-2AN

Sunshield kit, 304 stainless steel

7ML1930-1GA

Spare parts

Card, LU01 mother main, AC, comm ready

7ML1830-1KX

Card, LU02 mother main, AC, comm ready

7ML1830-1MA

Card, LU02 daughter, comm ready

7ML1830-1LP

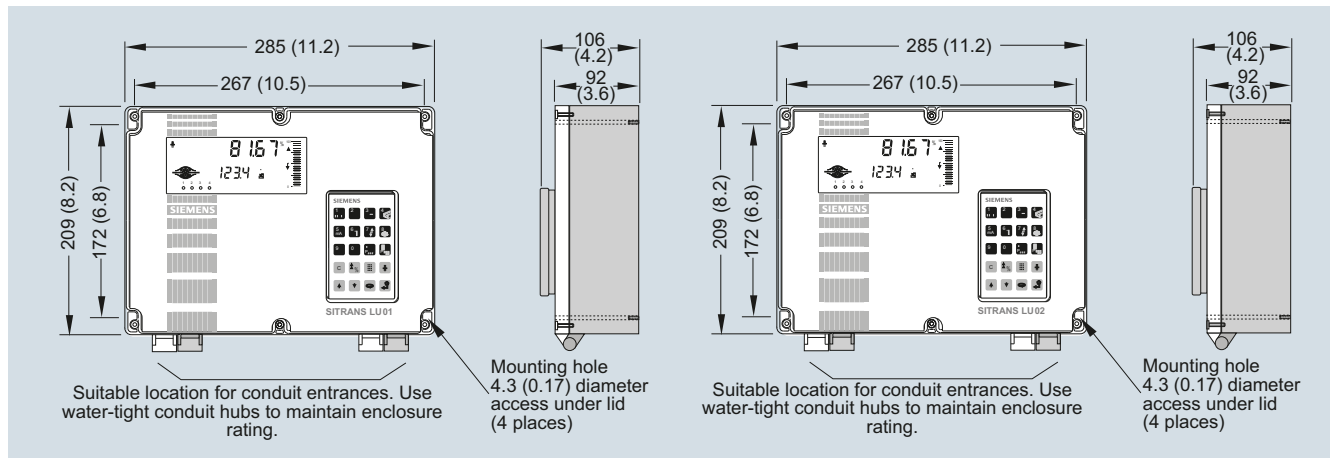
Card, LU01 daughter, comm ready

7ML1830-1LN

Card, display
See SmartLinx product page 4/360 for more information.

7ML1830-1LQ

Dimensional drawings



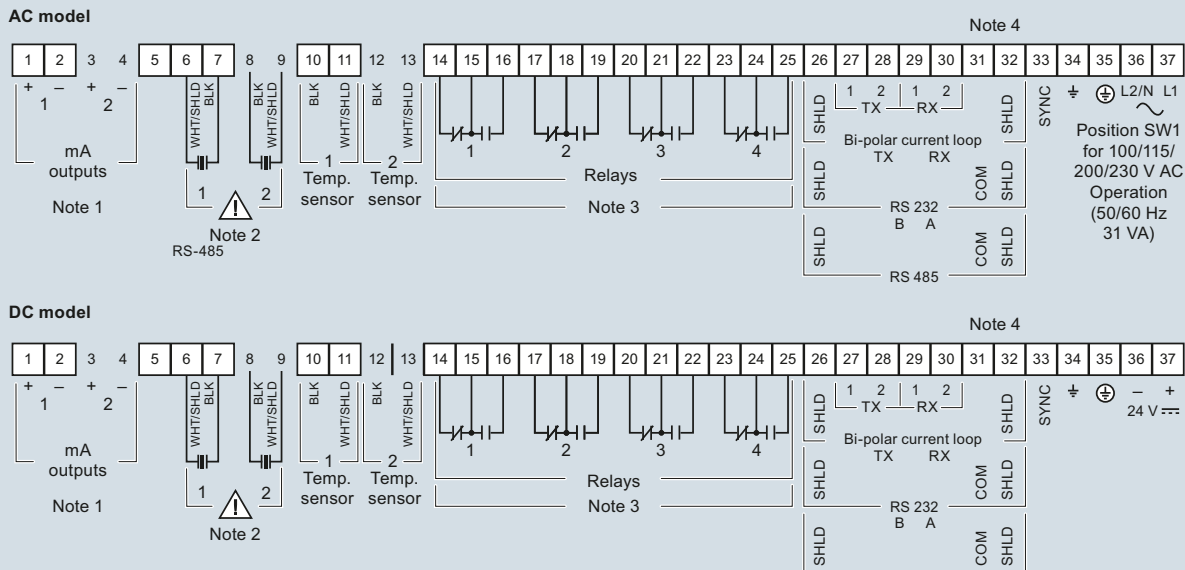
Dimensional drawings for SITRANS LU01 (left) and SITRANS LU02 (right), dimensions in mm (inch)

Level Measurement

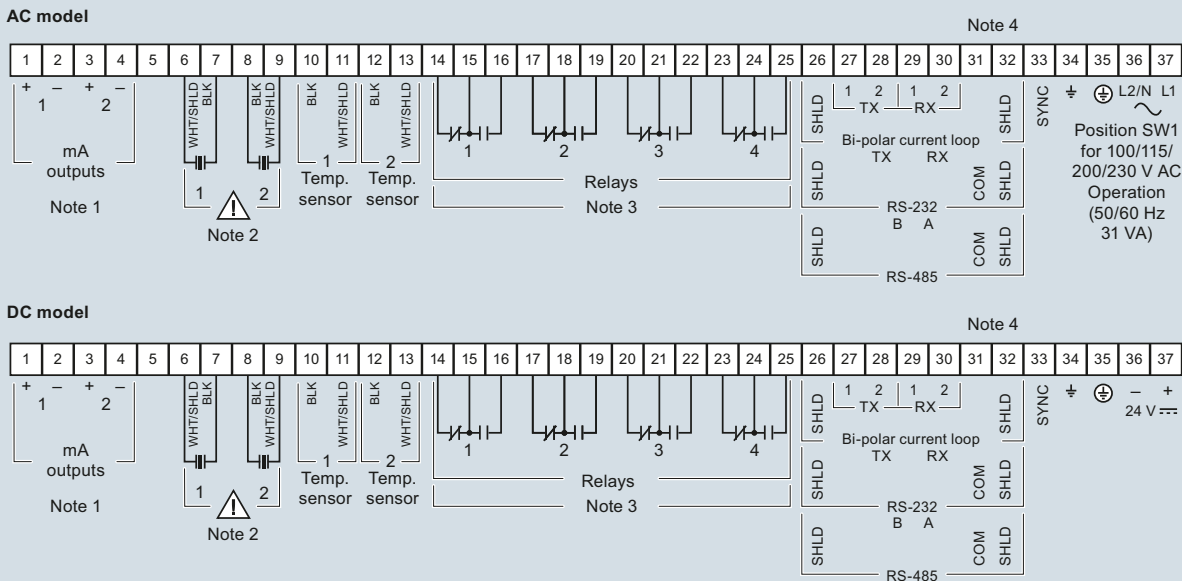
Continuous level measurement – Ultrasonic controllers

SITRANS LU01 and LU02

Schematics



SITRANS LU01 connections



SITRANS LU02 connections

4

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU10

Overview



SITRANS LU10 is an ultrasonic long-range level monitor for liquids and solids, offering 10-point monitoring in a single unit. Handheld programmer shown is an accessory and must be ordered separately.

Benefits

- Ten point, long-range level monitoring
- Automatic level-to-volume conversion for standard or custom tank shapes
- Dolphin Plus compatible
- Backlit LCD display with reading in standard engineering units
- Easy to install, easy to program using removable infrared keypad (optional)

Application

It can be used in a wide range of applications to scan liquids, solids or a combination of both contained in vessels of differing size, shape, and configuration up to 60 m (200 ft).

SITRANS LU10 uses ultrasonic technology to measure level, space, distance, volume, or average/differential. Transducers can be mounted up to 365 m (1 200 ft) from the monitor. The SITRANS LU10 features patented Sonic Intelligence echo processing software for superior reliability. Readings are displayed in user-selectable linear engineering units on the LCD.

- Key Applications: chemical storage, liquid storage, bulk solids storage (sugar, flour bins, grains, cereals), plastic pellets, tank farms

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU10

Technical specifications

Mode of operation		Power supply	
Measuring principle	Ultrasonic level measurement	100/115/200/230 V AC ± 15 %, 50/60 Hz, 31 VA	
Measuring range	Max. 0.3 ... 60 m (1 ... 200 ft)	Displays and controls	
Measuring points	Max. 10	51 x 127 mm (2 x 5 inch) graphics LCD with backlighting	
Output		Memory	EEPROM (non-volatile), no backup battery required
Ultrasonic transducer	EchoMax series, ST-H transducers	Programming	Using removable programmer (ordered separately) or Dolphin Plus (option)
Relays	SPDT Form C relays, rated 5 A at 250 V AC, resistive load	Certificates and approvals	
mA output	SITRANS LU A0 module (option): 0/4 ... 20 mA, optically isolated	<ul style="list-style-type: none"> • CE, RCM, FM, CSA_{US/CA}, ATEX II 3D • Lloyd's register of Shipping (Categories ENV1, ENV2, ENV3 and ENV5) 	
• Max. load	750 Ω, isolated	Options	
• Resolution	0.1 % of range	Expansion card	TIB-9, increases the number of TS-3 inputs from 1 ... 10
Accuracy		• External temperature sensor	TS-3
Error in measurement	0.25 % of range or 6 mm (0.24 inch), whichever is greater	• Communications	<ul style="list-style-type: none"> • Dolphin Plus: Siemens Windows-compatible interface and ComVerter link (infrared) • Max. 3 I/O devices per SITRANS LU10 • SITRANS LU AO analog output module (max. 1)
Resolution	0.1 % of measuring range or 2 mm (0.08 inch), whichever is greater	• I/O devices	
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) <ul style="list-style-type: none"> • Integral temperature sensor • External TS-3 temperature sensor (expandable to 10 inputs with optional TIB-9 card) • Programmable fixed temperature 		
Rated operating conditions			
Ambient conditions			
Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)		
Design			
Weight	2.7 kg (6 lb)		
Material (enclosure)	Polycarbonate		
Degree of protection (wall mount)	IP65/Type 4X/NEMA 4X		
Electrical connection			
Ultrasonic transducer	RG62-A/U coaxial cable with low capacitance		
Signal transmission	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm ² (22 ... 18 AWG), Belden 8760 or equivalent is acceptable		
Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V 5 A		
Synchronization	Up to 16 LU10 units can be synchronized together		

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU10

Selection and Ordering data

SITRANS LU10

Ten point ultrasonic long-range level monitoring system for liquids and solids applications, and ranges up to 60 m (200 ft).

↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Input voltage

100/115, 200/230 V AC, selectable

Feature software

Standard

Application software

Standard

Data communications

No module (SmartLinx ready)

TIB-9 temperature card

None

With TIB-9 card

Enclosure

Wall mount

Wall mount, drilled, 12 x M20 x1.5 for cable glands

Note: Cable glands are not included and should be ordered as a separate line on the order.

Approvals

CE, CSA_{US/C}, FM¹⁾

ATEX II 3D¹⁾

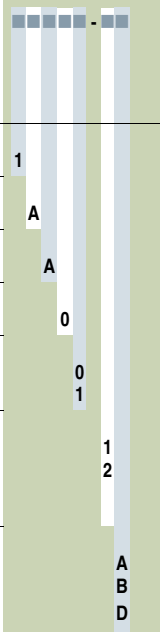
CE, RCM²⁾

¹⁾ Available with enclosure option 1 only

²⁾ Available with enclosure option 2 only

Article No.

7ML5007-



Selection and Ordering data

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification
(max. 27 characters) specify in plain text

Order code

Y15

Operating Instructions

English

French

German

Article No.

7ML1998-5AN02

7ML1998-5AN12

7ML1998-5AN32

Accessories

Handheld programmer

7ML1830-2AN

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch),
one text line, suitable for enclosures

7ML1930-1AC

Temperature Card TIB 9-card

7ML1830-1CN

M20 cable gland kit (6 M20 cable glands,
6 M20 nuts, 3 stop plugs)

7ML1830-1GM

M20 cable gland kit (4 M20 cable glands,
4 M20 nuts, 4 washers)

7ML1930-1FV

TS-3 Temperature Sensor - see TS-3 on page 4/189

Sunshield kit, 304 stainless steel

7ML1930-1GA

Spare parts

Card, mother main, AC, comm ready

7ML1830-1ML

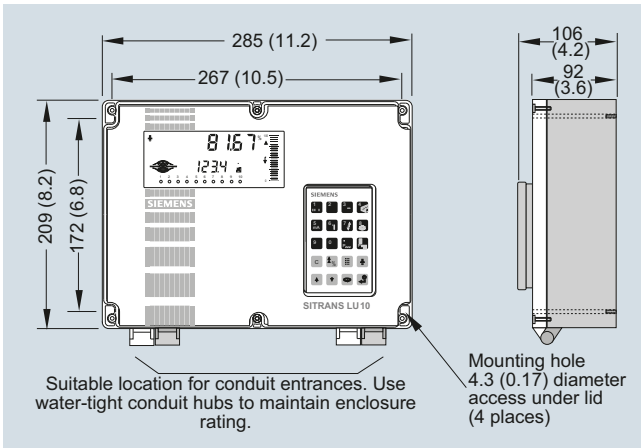
Card, daughter, comm ready

7ML1830-1LY

Card, display
See SmartLinx product on page 4/360 for more
information.

7ML1830-1LQ

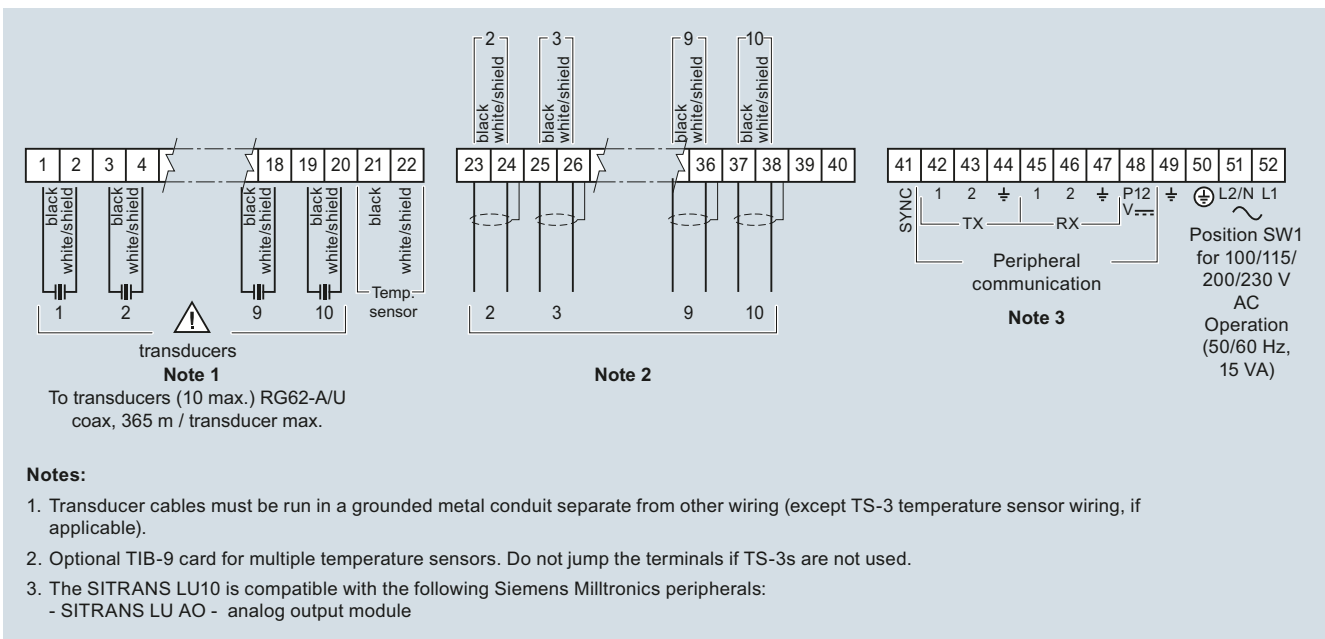
Dimensional drawings



SITRANS LU10, dimensions in mm (inch)

4

Schematics



SITRANS LU10 connections

Level Measurement

Continuous level measurement – Ultrasonic controllers

SITRANS LU AO

Overview



The SITRANS LU AO Analog Output Module provides remote analog output for the measurement points of the SITRANS LU10 level monitor.

Benefits

- Analog outputs can be up to 1 500 m (5 000 ft) from the SITRANS LU 10
- Analog outputs can be per transducer and/or average of 2 or more

Application

The operation of the SITRANS LU AO is programmed via the SITRANS LU10. The only on-board settings are for bank selection and output testing.

The SITRANS LU AO can provide up to 10 analog outputs (each sharing a common negative bus which is electrically isolated from ground).

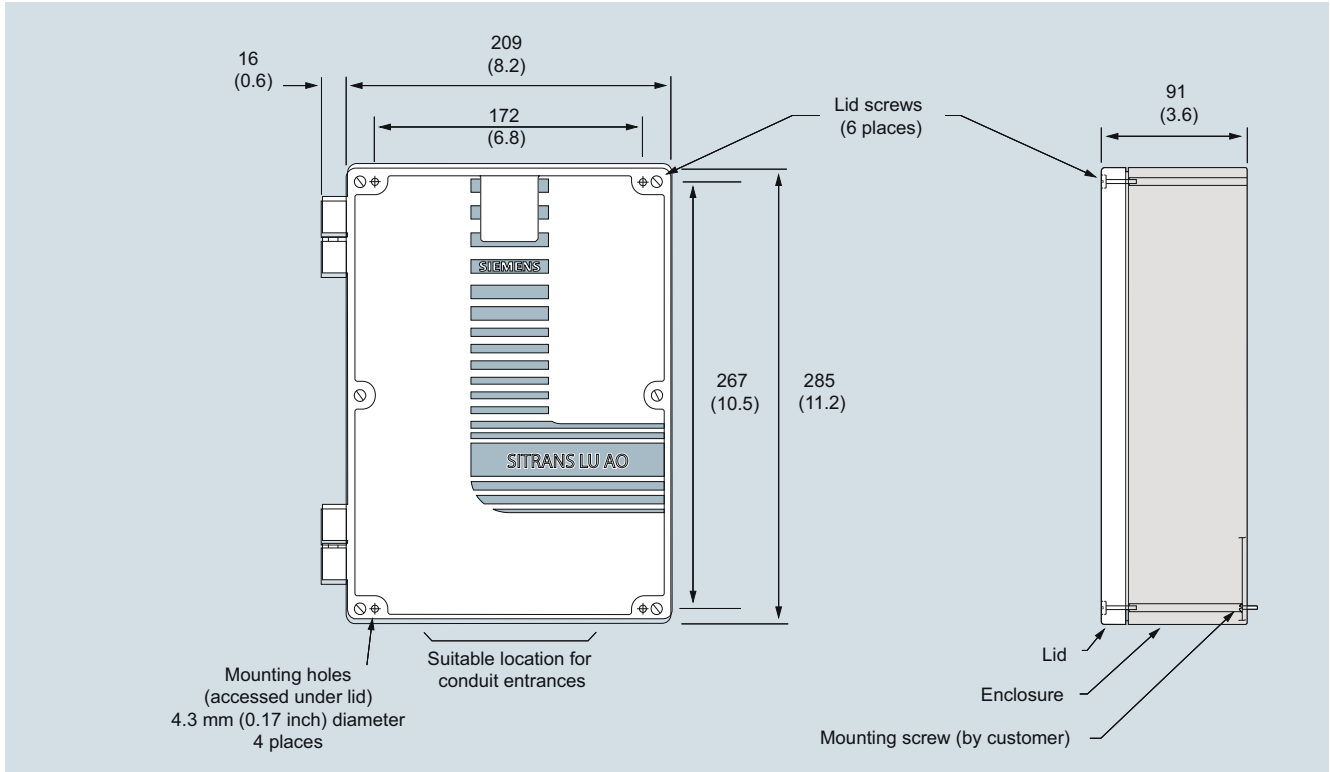
Technical specifications

Mode of operation	
Input	
Communications	Data from SITRANS LU10
Transmission rate	4 800 bits/s
Voltage	± 20 mA bipolar current loop
Polarization	Non-polarized
Max. load	1 receiving unit
Output	
Analog outputs	10 analog outputs, programmable from SITRANS LU10
	0 or 4 ... 20 mA, isolated
± 20 mA bipolar current loop	Input and transmission
• Max. load	750 Ω
• Resolution	0.1 %
Rated operating conditions	
Ambient conditions	
Ambient temperature for enclosure	-20 ... +50 °C (-5 ... +122 °F)
Location	Indoor/outdoor
Installation category	II
Pollution degree	4
Design	
Weight	2 kg (4.4 lb)
Material (enclosure)	Polycarbonate
Degree of protection	Type 4X/NEMA 4X/IP65
Cable connection	2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm ² (22 ... 18 AWG)
Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V 5 A
Power supply	100/115/200/230 V AC ± 15 %, 50/60 Hz, 15 VA
Displays and controls	1 LED for display of voltage/communications state
Certificates and approvals	CE, FM, CSA _{USC} , RCM

Selection and Ordering data

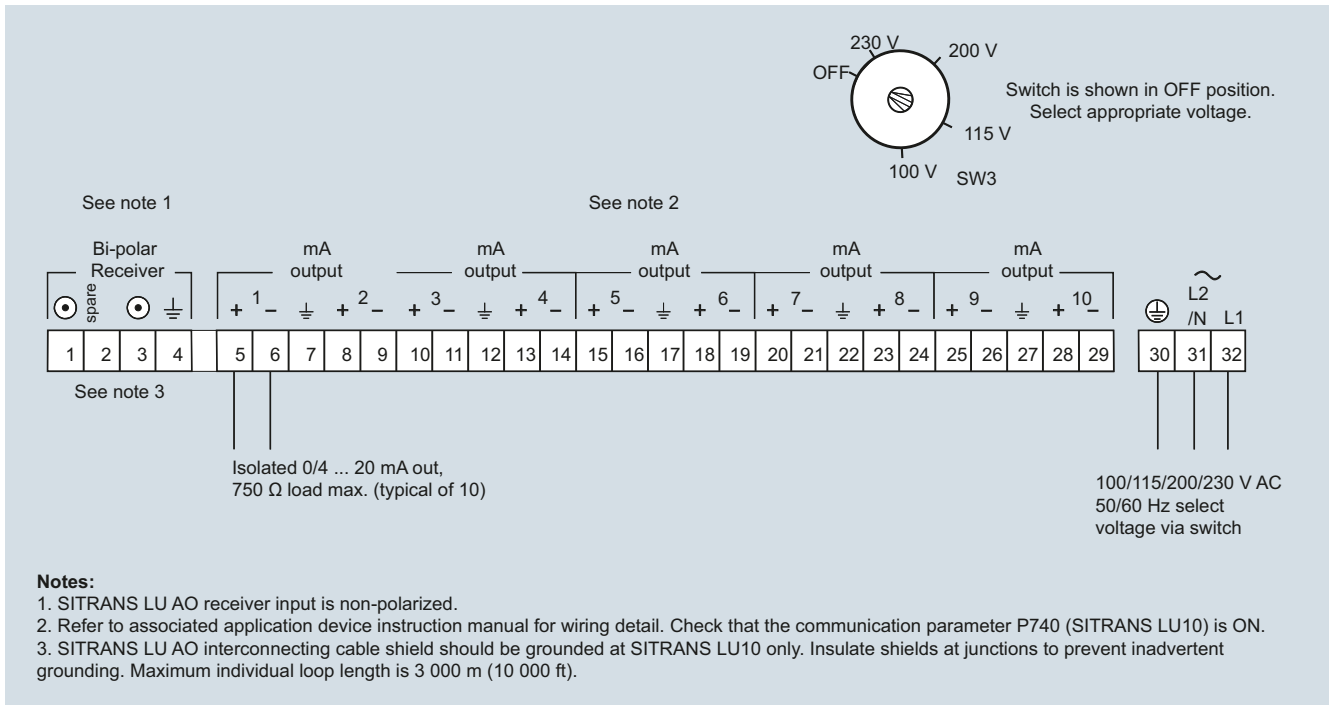
	Article No.
SITRANS LU AO Provides remote analog output for the measurement points of the SITRANS LU10 level monitor. Approvals: CSA _{USC} , FM, CE, RCM	7ML5810-1A
Operating Instructions	
English	7ML1998-5CE01
German	7ML1998-5CE31
Note: Operating Instructions should be ordered as a separate line item on the order.	
This device is shipped with the Siemens Milltronics manual DVD containing the Quick Start and Operating Instructions library.	
Accessories	
Sun Shield, 304 stainless steel	7ML1930-1GA

Dimensional drawings



SITRANS LU AO, dimensions in mm (inch)

Schematics



SITRANS LU AO connections

4

Level Measurement

Continuous level measurement – Ultrasonic transducers

Ultrasonic transducers

Overview

Ultrasonic Transducers

Ultrasonic measuring systems are the cost-effective choice for monitoring and control in short- to long-range applications for liquids, slurries, and solids in a wide range of industries. Transducers are impervious to dust, moisture, corrosion, vibration, flooding, and extreme temperature. They are easy to install and virtually maintenance-free. Choose from a wide selection of models designed for short or long range applications on liquids or solids.

Technical specifications

EchoMax Transducers					
	Liquids		Liquids and Solids Standard		
	XRS-5	ST-H	XPS-10	XPS-15	XPS-30
Max. range¹⁾	8 m (26 ft)	10 m (33 ft)	10 m (33 ft)	15 m (50 ft)	30 m (100 ft)
Min. range	0.3 m (1 ft)	0.3 m (1 ft)	0.3 m (1 ft)	0.3 m (1 ft)	0.6 m (2 ft)
Max. temperature	65 °C (149 °F)	73 °C (164 °F)	95 °C (203 °F)	95 °C (203 °F)	95 °C (203 °F)
Min. temperature	-20 °C (-4 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)
Typical Applications	Wet wells and open channels	Chemical storage and liquid tanks	Dusty solids and slurries	Deep wet wells and solids	Powders, pellets and solids
Frequency	44 kHz	44 kHz	44 kHz	44 kHz	30 kHz
Beam angle (-3dB)	10°	12°	12°	6°	6°
Thread size	R 1" [(BSPT), EN 10226] 1" NPT	1" and 2" NPT R 2" [(BSPT), EN 10226], 2" [(BSPP), EN ISO 228-1]	R 1" [(BSPT), EN 10226] 1" NPT	R 1" [(BSPT), EN 10226] 1" NPT	R 1.5" [(BSPT), EN 10226] Universal thread 1.5" NPT
Enclosure	<ul style="list-style-type: none"> PVDF Copolymer CSM Option: Flange with PTFE facing 	<ul style="list-style-type: none"> ETFE Option: PVDF 	<ul style="list-style-type: none"> PVDF Option: Foam facing Flange with PTFE facing 	<ul style="list-style-type: none"> PVDF Option: Foam facing Flange with PTFE facing 	<ul style="list-style-type: none"> PVDF Option: Foam facing Flange with PTFE facing
Compatible with:					
SITRANS LUT400	•	•	•	•	•
SITRANS LU	•	•	•	•	•
HydroRanger 200	•	•	•	•	
MultiRanger 100/200	•	•	•	•	

¹⁾ Application conditions such as extreme dust or angle of repose may reduce the usable maximum range. Consult your local Siemens representative for further information.

Overview



ST-H transducers use ultrasonic technology to measure level in chemical storage and liquid tanks.

Benefits

- Can be mounted on a narrow standpipe
- Immune to corrosive and harsh environments
- Integral temperature sensor

Application

The narrow design of the ST-H allows the transducer to be mounted on a narrow standpipe. When mounted correctly, it is completely protected from the process and can even be used in harsh, corrosive environments.

During operation, the ultrasonic transducer emits acoustic pulses in a narrow beam perpendicular to the transducer face. The level transceiver measures the propagation time between pulse emission and reception of the echo to calculate the distance from the transducer to the material. Variations in sound velocity due to changes in temperature within the permissible range are automatically compensated by the integral temperature sensor.

- Key Applications: chemical storage, liquid tanks

Technical specifications

Mode of operation	
Measuring principle	Ultrasonic transducer
Input	
Measuring range	0.3 ... 10 m (1 ... 33 ft)
Output	
Frequency	44 kHz
Beam angle	12°
Accuracy	
Temperature compensation	Compensated by integral temperature sensor
Rated operating conditions	
Pressure	Normal atmospheric pressure
Ambient conditions	
• Ambient temperature	-20 ... +60 °C (-5 ... +140 °F) (ATEX approved model) -40 ... +73 °C (-40 ... +163 °F) (CSA/FM approved model)
Design	
Weight ¹⁾	1.4 kg (3 lb)
Material (enclosure)	Base and lid made of ETFE or PVDF (epoxy fitted joint) ²⁾
Process connection	2" NPT [(Taper), ANSI/ASME B1.20.1], R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
Degree of protection	IP68
Cable connection	2-core shielded/twisted, 0.519 mm ² (20 AWG), PVC sheath
Cable (max. length)	365 m (1 200 ft) with RG 62 A/U coaxial cable
Options	
• Flange adapter	3" Universal (fits DN 65, PN 10 and 3" ASME)
Certificates and approvals	
CE, CSA Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G T3 (ETFE only), FM Class I, II, Div. 1, Groups C, D, E, F, G T4A, ATEX II 2G / INMETRO Ex mb IIC T5 Gb, RCM, KCC	

¹⁾ Approximate shipping weight of transducer with standard cable length

²⁾ When measuring chemicals, check compatibility of ETFE or PVDF and epoxy, or mount joint external to process.

Level Measurement

Continuous level measurement – Ultrasonic transducers

ST-H

Selection and Ordering data

Article No.

EchoMax ST-H ultrasonic transducer

7ML1100-

Level measurement in chemical storage and liquid tanks. The narrow design of the ST-H allows the transducer to be mounted on a 2 inch standpipe. Measuring range: min. 0.3 m (1 ft), max. 10 m (33 ft).

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process connection

ETFE, 2" NPT [(Taper), ANSI/ASME B1.20.1]
ETFE, R 2" [(BSPT), EN 10226]
ETFE, G 2" [(BSPP), EN ISO 228-1]

0

1

2

PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1]

3

PVDF copolymer, R 2" [(BSPT), EN 10226]

4

PVDF copolymer, G 2" [(BSPP), EN ISO 228-1]

5

Cable length

5 m (16.40 ft)
10 m (32.81 ft)
30 m (98.43 ft)
50 m (164.04 ft)
100 m (328.08 ft)

A

B

C

D

E

Approvals

CE, FM Class I, II, Div. 1, Groups C,D,E,F,G T4A
ATEX 2G / INMETRO Ex mb IIC T5 Gb, RCM, KCC
CSA Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G T3
CE, ATEX 2G / INMETRO Ex mb IIC T5 Gb, RCM, KCC

2

3

4

Operating Instructions

Article No.

Quick Start Manual, multi-language

A5E32105880

Applications Guidelines, multi-language

7ML1998-5HV61

Note: The Applications Guidelines should be ordered as a separate line item on the order.

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

- 1) Available with Process connection options 0 ... 2 only
- 2) Available with Process connection options 3 ... 5 only
- 3) Not suitable for Ketone, Hexane, Ester or Ethyl Acetate atmospheres

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters) specify in plain text

Y17

Accessories

Article No.

Universal box bracket, mounting kit

7ML1830-1BK

3" ASME, DN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" NPT

7ML1830-1BT

3" ASME, DN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" BSPT

7ML1830-1BU

Easy Aimer 2, NPT with 3/4" x 1" PVC coupling

7ML1830-1AQ

Easy Aimer 2, aluminum with M20 adapter and 1" and 1 1/2" BSPT aluminum couplings

7ML1830-1AX

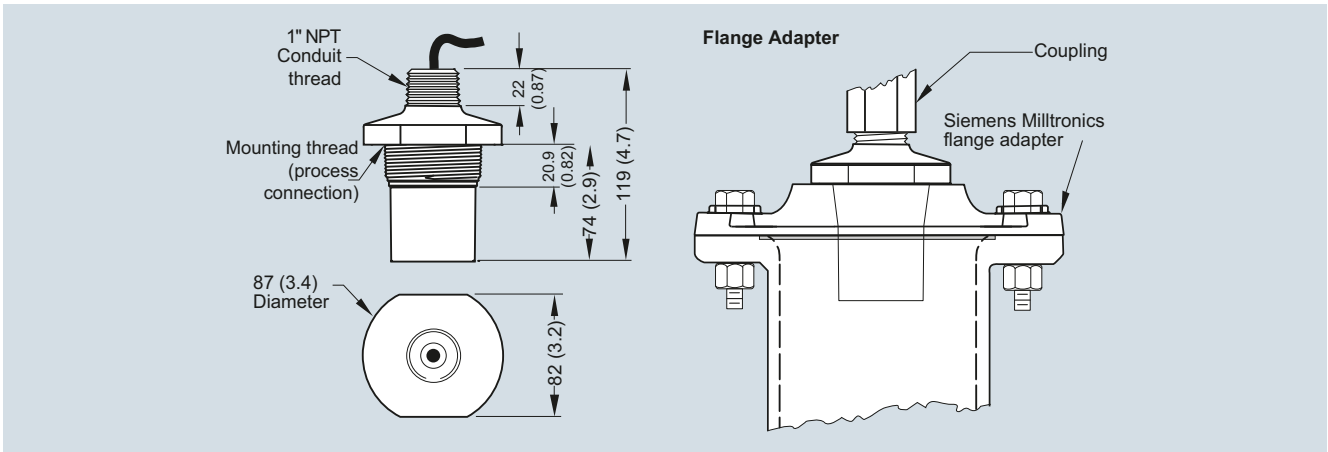
Easy Aimer 304, with stainless steel coupling

7ML1830-1AU

Easy Aimer 304, with M20 adapter and 1" and 1 1/2" BSPT 304 stainless steel couplings

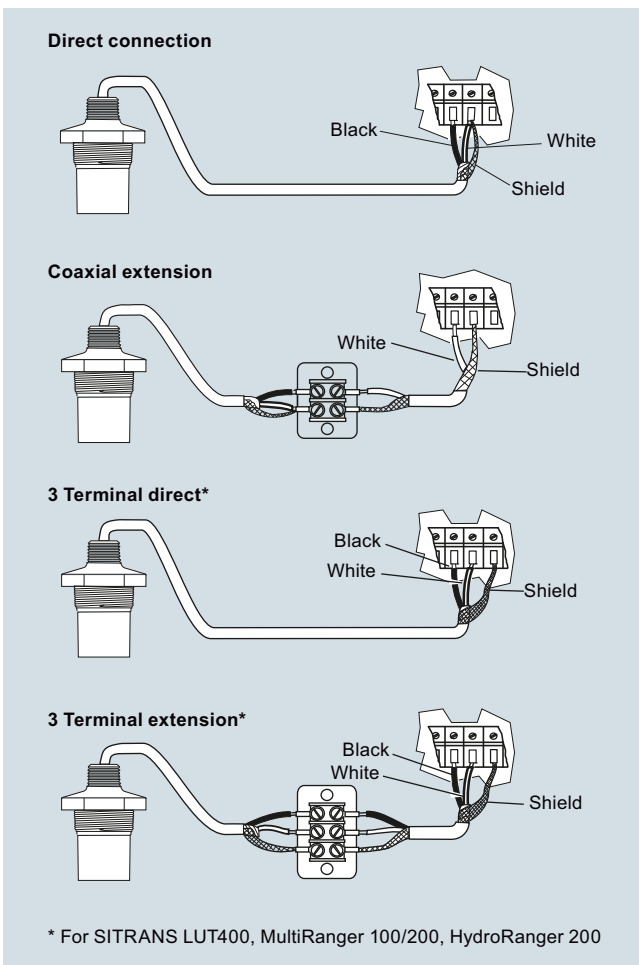
7ML1830-1GN

Dimensional drawings



ST-H ultrasonic transducer, dimensions in mm (inch)

Schematics



ST-H ultrasonic transducer connections

Level Measurement

Continuous level measurement – Ultrasonic transducers

EchoMax XRS-5

Overview



EchoMax XRS-5 ultrasonic transducer provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds using a beam angle of just 10° and a CSM rubber face.

Benefits

- Narrow beam angle of only 10°
- Chemically resistant PVDF copolymer enclosure and CSM rubber face
- Measuring range: 8 m (26 ft) for measurement of liquids and slurries
- Fully submersible: IP68 degree of protection
- Easy installation with 1" NPT or R 1" BSPT connection

Application

The XRS-5 is non-contacting with a measuring range from 0.3 ... 8 m (1 ... 26 ft). Advanced echo processing ensures reliable data even in conditions with obstructions, turbulence and foam.

The hermetically sealed CSM rubber face and the PVDF copolymer enclosure are designed for maximum resistance to methane, salt water, caustics and harsh chemicals common to wastewater installations. With an IP68 degree of protection, this rugged sensor is fully submersible in the event of flood conditions. Use a submergence shield if full submergence is possible in the application. A submergence shield will maintain a high level reading output during submerged conditions.

The low-cost XRS-5 transducer is compatible with a full range of Siemens controllers, from a basic system for high/low alarm or simple pump control, up to advanced control systems with communications, telemetry and SCADA integration capabilities.

- Key Applications: wet wells, flumes, weirs, filter beds


Technical specifications

Mode of operation	
Measuring principle	Ultrasonic transducer
Input	
Measuring range	0.3 ... 8 m (1 ... 26 ft), dependent on application
Output	
Frequency	44 kHz
Beam angle	10°
Accuracy	
Temperature error	Compensated by integral temperature sensor
Rated operating conditions	
Vessel pressure	Normal atmospheric pressure
Ambient conditions	
• Ambient temperature	-20 ... +65 °C (-4 ... +149 ° F)
Design	
Weight (approximate shipping weight of sensor with standard cable length)	1.2 kg (2.6 lb)
Material (enclosure)	PVDF copolymer enclosure and CSM face
Process connection	1" NPT [(Taper), ANSI/ASME B1.20.1] or R 1" [(BSPT), EN 10226]
Degree of protection	IP65/IP68
Cable connection	2-core shielded/twisted, 0.5 mm ² (20 AWG), PVC sheath
Cable (max. length)	<ul style="list-style-type: none"> • 365 m (1 200 ft) with RG 62 A/U coaxial cable • 365 m (1 200 ft) with 2-core twisted pair, foil shield, 0.5 mm² (20 AWG), PVC sheath, only for MultiRanger 100/200
Options	
Flange version	Factory flange with PTFE face for ASME, EN or JIS configuration
Submergence shield	For applications with flooding possible
Certificates and approvals	
CE, RCM, KCC CSA Class I, Div. 2, Groups A,B,C,D, Class II, Div. 1 Groups E,F,G FM Class I, Zone 1, AEx m IIC, T6 Class II, III, Div. 1, Groups E,F,G T6 ATEX II 2GD / IECEx / INMETRO Ex mb IIC T6 Gb, Ex tb IIIC T85 °C Db	

Level Measurement

Continuous level measurement – Ultrasonic transducers

EchoMax XRS-5

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
EchoMax XRS-5 transducer With a beam angle of 10°, the XRS-5 provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds. Measuring range: min. 0.3 m (1 ft), max. 8 m (26 ft) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1106- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters) specify in plain text	Y17
Process connection 1" NPT [(Taper), ANSI/ASME B1.20.1] ◆ 1 R 1" [(BSPT), EN 10226] ◆ 2	A B C	Accessories Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch), one text line for fastening on sensors Submergence shield kit Easy Aimer 2, NPT with 3/4" x 1" PVC coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1 1/2" BSPT aluminum couplings Easy Aimer 304, with stainless steel coupling Easy Aimer 304, with M20 adapter and 1" and 1 1/2" BSPT 304 stainless steel couplings FMS-200 universal box bracket, mounting kit FMS-210 channel bracket, wall mount FMS-220 extended channel bracket, wall mount FMS-310 channel bracket, floor mount FMS-320 extended channel bracket, floor mount FMS-350 bridge channel bracket, floor mount (see Mounting Brackets on page 4/187 for more information)	Article No. 7ML1930-1BJ 7ML1830-1BH 7ML1830-1AQ 7ML1830-1AX 7ML1830-1AU 7ML1830-1GN 7ML1830-1BK 7ML1830-1BL 7ML1830-1BM 7ML1830-1BN 7ML1830-1BP 7ML1830-1BQ
Cable length 5 m (16.40 ft) ◆ 10 m (32.81 ft) ◆ 30 m (98.43 ft) ◆	2	1" NPT locknut, plastic 1" BSPT locknut, plastic	7ML1830-1DS 7ML1830-1DR
Facing Standard (CSM rubber) ◆ PTFE (flange versions) ◆	A B	◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	
Approvals CE, RCM, KCC, CSA Class I, Div. 2, Groups A,B,C,D, Class II, Div. 1 Groups E,F,G FM Class I, Zone 1, AEx m IIC, T6 Class II, III, Div. 1, Groups E,F,G T6 ATEX II 2GD / IECEX / INMETRO Ex mb IIC T6 Gb, Ex tb IIIC T85 °C Db	A B C D J K L Q R S		
Mounting flange (flush mount) None ◆ 3" ASME, 150 lb, flat faced 4" ASME, 150 lb, flat faced 6" ASME, 150 lb, flat faced DN 80, PN 10/16, Type A, flat faced DN 100, PN 10/16, Type A, flat faced DN 150, PN 10/16, Type A, flat faced JIS10K 3B style JIS10K 4B style JIS10K 6B style Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.	A B C D J K L Q R S		
Operating Instructions Quick Start Manual, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32299685 7ML1998-5HV61		

Level Measurement

Continuous level measurement – Ultrasonic transducers

EchoMax XRS-5

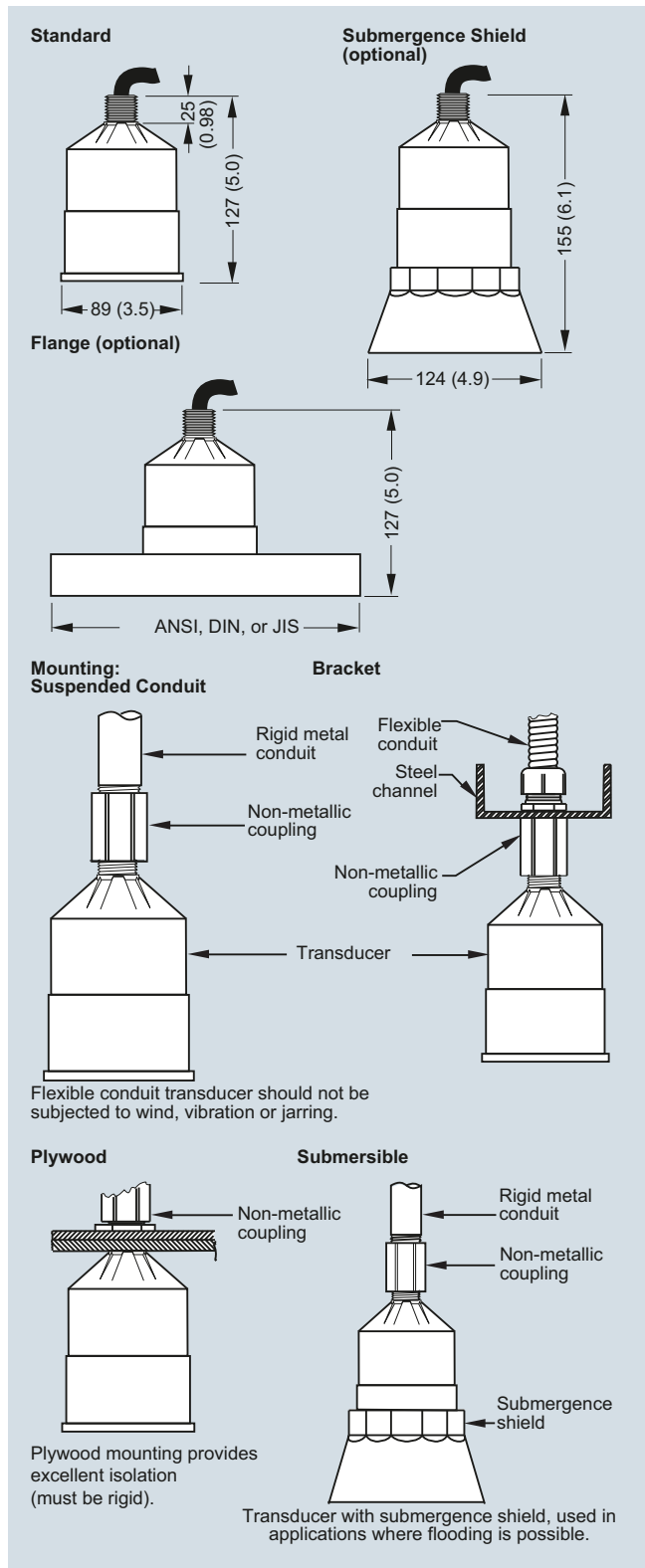
Selection and Ordering data	Article No.
EchoMax XRS-5C transducer With a beam angle of 10°, the XRS-5 provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds. Measuring range: min. 0.3 m (1 ft), max. 8 m (26 ft) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1105-
Process connection 1" NPT [(Taper), ANSI/ASME B1.20.1]	
Cable length 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft)	
Facing Standard (CSM rubber) PTFE (flange versions)	
Approvals CSA Class I Div. 1, Group A,B,C,D; Class II Div. 1, Group E,F,G; Class III	
Mounting flange (flush mount) None 3" ASME, 150 lb, flat faced 4" ASME, 150 lb, flat faced 6" ASME, 150 lb, flat faced Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.	
Operating Instructions Quick Start Manual, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32299685 7ML1998-5HV61

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters) specify in plain text	
Accessories	Article No.
Submergence shield kit	7ML1830-1BH
Easy Aimer 2, NPT with 3/4" x 1" PVC coupling	7ML1830-1AQ
Easy Aimer 304, with stainless steel coupling	7ML1830-1AU
FMS-200 universal box bracket, mounting kit	7ML1830-1BK
FMS-210 channel bracket, wall mount	7ML1830-1BL
FMS-220 extended channel bracket, wall mount	7ML1830-1BM
FMS-310 channel bracket, floor mount	7ML1830-1BN
FMS-320 extended channel bracket, floor mount	7ML1830-1BP
FMS-350 bridge channel bracket, floor mount (see Mounting Brackets on page 4/187 for more information)	7ML1830-1BQ

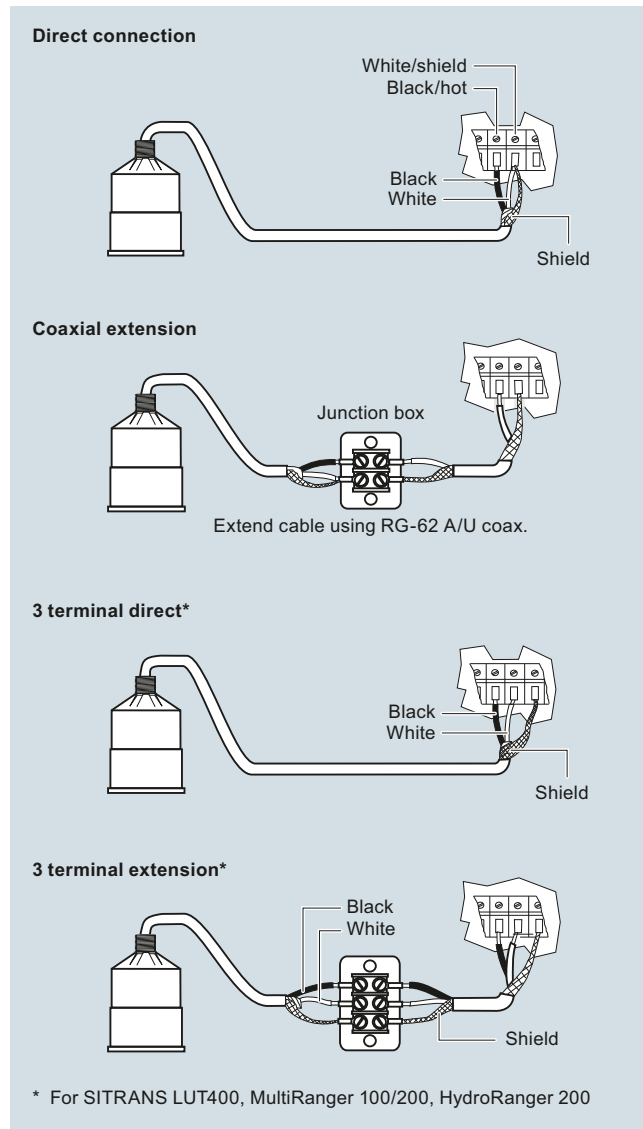
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Dimensional drawings



XRS-5 ultrasonic transducer, dimensions in mm (inch)

Schematics



XRS-5 ultrasonic transducer connections

Level Measurement

Continuous level measurement – Ultrasonic transducers

EchoMax XPS

Overview



EchoMax XPS transducers use ultrasonic technology to measure level in a wide range of liquids and solids.

Benefits

- Integral temperature compensation
- Low ringing effect reduces blanking distance
- Optional foam facing for dusty applications
- Self-cleaning and low-maintenance
- Chemically resistant
- Hermetically sealed

Application

XPS transducers can be fully immersed, are resistant to steam and corrosive chemicals, and can be installed without flanges.

The XPS series offers versions for various measuring ranges up to 30 m (100 ft) and up to a max. temperature of 95 °C (203 °F).

During operation, the EchoMax transducers emit acoustic pulses in a narrow beam. The level monitor measures the propagation time between pulse emission and its reflection (echo) to calculate the distance.

Technical specifications










Input	XPS-10	XPS-15 (standard and F models)	XPS-30
Measuring range	0.3 ... 10 m (1 ... 33 ft)	<u>Standard:</u> 0.3 ... 15 m (1 ... 50 ft) <u>XPS-15F:</u> 0.45 ... 15 m (1.5 ... 50 ft)	0.6 ... 30 m (2 ... 100 ft)
Output			
Frequency	44 kHz	44 kHz	30 kHz
Beam angle	12°	6°	6°
Environmental			
Location	Indoors/outdoors		
Ambient temperature	-40 ... +95 °C (-40 ... +203 °F)	<u>XPS-15F:</u> -20 ... +95 °C (-4 ... +203 °F)	-40 ... +95 °C (-40 ... +203 °F)
Pollution degree	4		
Pressure	8 bar g (120 psi g) <u>Flanged:</u> 0.5 bar g (7.25 psi g)	8 bar g (120 psi g) <u>Flanged:</u> 0.5 bar g (7.25 psi g)	0.5 bar g (7.25 psi g) <u>Flanged:</u> 0.5 bar g (7.25 psi g)
Design			
Weight	0.8 kg (1.8 lb)	1.3 kg (2.8 lb) <u>Flanged:</u> 2 kg (4.4 lb)	4.3 kg (9.5 lb)
Power supply	Operation of transducer only with approved Siemens Milltronics controllers		
Material	<u>Standard:</u> PVDF <u>Flanged:</u> PVDF with CPVC flange <u>Option:</u> PTFE face with CPVC flange	<u>Standard:</u> PVDF <u>Flanged:</u> PVDF with CPVC flange <u>Option:</u> PTFE face with CPVC flange	<u>Standard:</u> PVDF <u>Flanged:</u> PVDF with CPVC flange <u>Option:</u> PTFE face with CPVC flange
Color	Blue	<u>Standard:</u> Blue <u>XPS-15F:</u> Gray	Blue
Process connection	1" NPT or 1" BSPT	<u>Standard:</u> 1" NPT or 1" BSPT <u>XPS-15F:</u> 1" NPT	1.5" universal thread (NPT or BSPT)
Degree of protection	IP66/68	IP66/68	IP66/68
Cable	2 wire twisted pair/braided and foil shielded 0.5 mm ² (20 AWG) PVC jacket		
Separation	Max. 365 m (1 200 ft)		
Certificates and approvals	<u>Standard:</u> CE, CSA, FM, ATEX, IECEx	<u>Standard:</u> CE, CSA, FM, ATEX, IECEx <u>XPS-15F:</u> FM Class I, Div. 1, Groups A, B, C and D, Class II Div. 1, Groups E, F and G, Class III	CE, CSA, FM, ATEX, IECEx

¹⁾ EMC certificate available on request.

Level Measurement

Continuous level measurement – Ultrasonic transducers



EchoMax XPS


Selection and Ordering data	Article No.	Selection and Ordering data	Order code
EchoMax XPS-10 ultrasonic transducer High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 10 m ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1115- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring point number/ identification (max. 27 characters) specify in plain text	Y15
Mounting thread and facing 1" NPT [(Taper), ANSI/ASME B1.20.1]  0 1" NPT [(Taper), ANSI/ASME B1.20.1] with foam facing ¹⁾ 1 1" NPT [(Taper), ANSI/ASME B1.20.1] with PTFE facing ²⁾ 2 R 1" [(BSPT), EN 10226]  3 R 1" [(BSPT), EN 10226] with foam facing ¹⁾ 4 R 1" [(BSPT), EN 10226] with PTFE facing ²⁾ 5		Operating Instructions Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32282889 7ML1998-5HV61
Cable length 5 m (16.40 ft)  B 10 m (32.81 ft)  C 30 m (98.43 ft)  E 50 m (164.04 ft) F 100 m (328.08 ft) K		Accessories Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch), one text line for fastening on sensors Submergence shield kit Easy Aimer 2, with 3/4" x 1" NPT PVC coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1 1/2" BSPT aluminum couplings Easy Aimer 304, with stainless steel coupling Easy Aimer 304, with M20 adapter and 1" and 1 1/2" BSPT 304 stainless steel couplings Universal box bracket, mounting kit Channel bracket, wall mount Extended channel bracket, wall mount Channel bracket, floor mount Extended channel bracket, floor mount Bridge channel bracket, floor mount (see Mounting Brackets on page 4/187 for more information) 1" NPT locknut, plastic 1" BSPT locknut, plastic	7ML1930-1BJ 7ML1830-1BH 7ML1830-1AQ 7ML1830-1AX 7ML1830-1AU 7ML1830-1GN 7ML1830-1BK 7ML1830-1BL 7ML1830-1BM 7ML1830-1BN 7ML1830-1BP 7ML1830-1BQ 7ML1830-1DS 7ML1830-1DR
Mounting flange None  A 3" ASME, 150 lb, flat faced C 4" ASME, 150 lb, flat faced D 6" ASME, 150 lb, flat faced E 8" ASME, 150 lb, flat faced F DN 80, PN 10/16, Type A, flat faced G DN 100, PN 10/16, Type A, flat faced J DN 150, PN 10/16, Type A, flat faced L JIS10K3B Style M JIS10K4B Style P JIS10K6B Style R (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)			
Approvals ATEX 2GD Ex mb IIC T4 Gb, Ex tb IIIC T135 °C Db;  3 IECEx SIR 13.0009X Ex mb IIC T4 Gb, Ex tb IIIC T135 °C Db; FM Class I, Div. 2, Groups A,B,C,D; Class II, Div. 1, Groups E,F,G; Class III CSA Class I, Div. 1, Groups A,B,C,D, Class II, Div. 1, Groups E,F,G, Class III ³⁾  4			

¹⁾ Not available with flanged versions

²⁾ Available with flanged versions only

³⁾ Valid with mounting thread and facing options 0 ... 2 only


 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
EchoMax XPS-15 ultrasonic transducer High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 15 m ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1118- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: ● Y15 Measuring point number/ identification (max. 27 characters) specify in plain text	
Mounting thread and facing 1" NPT [(Taper), ANSI/ASME B1.20.1] ● 0 1" NPT [(Taper), ANSI/ASME B1.20.1] with foam facing ¹⁾ 1 1" NPT [(Taper), ANSI/ASME B1.20.1] with PTFE facing ²⁾ 2 R 1" [(BSPT), EN 10226] ● 3 R 1" [(BSPT), EN 10226] with foam facing ¹⁾ 4 R 1" [(BSPT), EN 10226] with PTFE facing ²⁾ 5		Operating Instructions Quick Start guide, multi-language A5E32282889 Applications Guidelines, multi-language 7ML1998-5HV61 Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32282889 7ML1998-5HV61
Cable length 5 m (16.40 ft) ● B 10 m (32.81 ft) ● C 30 m (98.43 ft) ● E 50 m (164.04 ft) ● F 100 m (328.08 ft) ● K		Accessories Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch), one text line for fastening on sensors 7ML1930-1BJ Submergence shield kit 7ML1830-1BJ Universal box bracket, mounting kit 7ML1830-1BK Channel bracket, wall mount 7ML1830-1BL Extended channel bracket, wall mount 7ML1830-1BM Channel bracket, floor mount 7ML1830-1BN Extended channel bracket, floor mount 7ML1830-1BP Bridge channel bracket, floor mount (see Mounting Brackets on page 4/187 for more information) 7ML1830-1BQ 1" NPT locknut, plastic 7ML1830-1DS 1" BSPT locknut, plastic 7ML1830-1DR Easy Aimer 2, with ¾" x 1" NPT PVC coupling 7ML1830-1AQ Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings 7ML1830-1AX Easy Aimer 304 with stainless steel coupling 7ML1830-1AU Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 stainless steel couplings 7ML1830-1GN	
Mounting flange None ● A 6" ASME, 150 lb, flat faced D 8" ASME, 150 lb, flat faced E DN 150, PN 10/16, Type A, flat faced J DN 200, PN 10, Type A, flat faced K JIS10K 6B N JIS10K 8B P (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)			
Approvals ATEX 2GD Ex mb IIC T4 Gb, Ex tb IIIC T135 °C Db; ● 3 IECEx SIR 13.0009X Ex mb IIC T4 Gb, Ex tb IIIC T135 °C Db; FM Class I, Div. 2, Groups A,B,C,D; Class II, Div. 1, Groups E,F,G; Class III CSA Class I, Div. 1 Groups A,B,C,D, Class II, Div. 1, Groups E,F,G, Class III ³⁾ ● 4		● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	
¹⁾ Not available with flanged versions ²⁾ Available with flanged versions only ³⁾ Available with mounting options 0 ... 2 only ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.			


Level Measurement

Continuous level measurement – Ultrasonic transducers

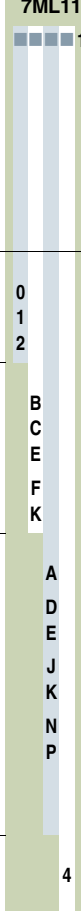
EchoMax XPS

Selection and Ordering data	Article No.
EchoMax XPS-15F ultrasonic transducer High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 15 m Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1171- 
Mounting thread and facing 1" NPT [(Taper), ANSI/ASME B1.20.1]	1
Cable length 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	B C D E F
Mounting flange, flush mount None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)	A B C
Approvals FM Class I, Div. 1, Groups A, B, C, and D, Class II Div. 1, Groups E, F, and G, Class III	1

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring point number/ identification (max. 27 characters) specify in plain text	Y15
Operating Instructions English Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32725813 7ML1998-5HV61
Accessories Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch), one text line for fastening on sensors Submergence shield kit Universal box bracket, mounting kit Channel bracket, wall mount Extended channel bracket, wall mount Channel bracket, floor mount Extended channel bracket, floor mount Bridge channel bracket, floor mount (see Mounting Brackets on page 4/187 for more information) 1" NPT locknut, plastic Easy Aimer 2, with 3/4" x 1" NPT PVC coupling Easy Aimer 304 with stainless steel coupling	7ML1930-1BJ 7ML1830-1BJ 7ML1830-1BK 7ML1830-1BL 7ML1830-1BM 7ML1830-1BN 7ML1830-1BP 7ML1830-1BQ 7ML1830-1DS 7ML1830-1AQ 7ML1830-1AU

Selection and Ordering data	Article No.
EchoMax XPS-30 ultrasonic transducer High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. 1½" universal thread compatible with 1½" NPT and R 1½" [(BSPT), EN 10226] Measuring range: min. 0.6 m (1.97 ft), max. 30 m (98.43 ft) Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1123- 
Mounting thread and facing 1½" universal thread 1½" universal thread, foam facing ¹⁾ 1½" universal thread, PTFE facing ²⁾	0 1 2
Cable length 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	B C E F K
Mounting flange None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced DN 150, PN 10/16, Type A, flat faced DN 200, PN 10, Type A, flat faced JIS10K 6B JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)	A D E J K N P
Approvals ATEX 2G 1D Ex mb IIC T4 Gb, Ex ta IIIC T135 °C Da; IECEx SIR 13.0009X Ex mb IIC T4 Gb, Ex ta IIIC T135 °C Da	5

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Operating Instructions Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32282889 7ML1998-5HV61
Accessories Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch), one text line for fastening on sensors 1½" BSPT locknut, plastic Easy Aimer 2, 1½" NPT galvanized coupling Easy Aimer 304, NPT with 1½" coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 stainless steel couplings	7ML1930-1BJ 7ML1830-1DP 7ML1830-1AN 7ML1830-1AT 7ML1830-1AX 7ML1830-1GN

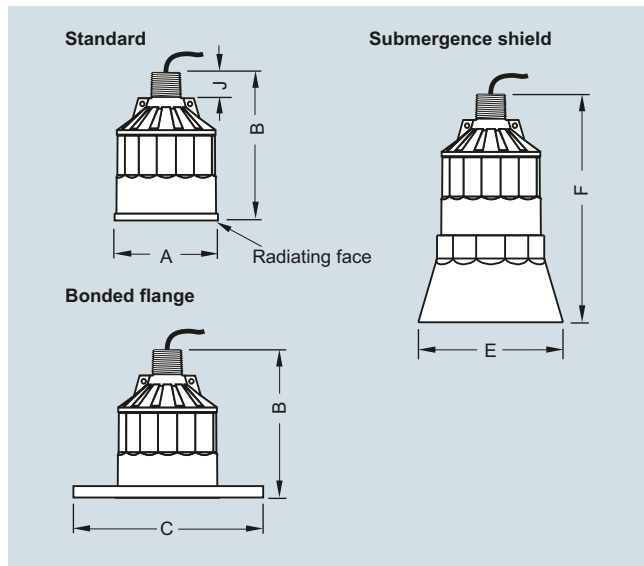
Selection and Ordering data	Article No.	Selection and Ordering data	Order code
EchoMax XPS-30C ultrasonic transducer High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. 1½" universal thread compatible with 1½" NPT and R 1½" [(BSPT), EN 10226] Measuring range: min. 0.6 m (1.97 ft), max. 30 m (98.43 ft) Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML1155- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 mm x 50 mm (2.71 x 1.97 inch)]: Measuring-point number / identification (max. 27 characters) specify in plain text	Y15
Mounting thread and facing 1½" universal thread 1½" universal thread, foam facing ¹⁾ 1½" universal thread, PTFE facing ²⁾	0 1 2	Operating Instructions Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32282889 7ML1998-5HV61
Cable length 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	B C E F K	Accessories Easy Aimer II NPT 1.5" Galvanized Easy Aimer 304, NPT with 1.5" coupling 1½" BSPT locknut, plastic	7ML1830-1AN 7ML1830-1AT 7ML1830-1DP
Mounting flange None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced DN 150, PN 10/16, Type A, flat faced DN 200, PN 10, Type A, flat faced JIS10K 6B JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)	A D E J K N P	¹⁾ Not available with flanged version ²⁾ Available for flanged versions only	
Approvals CSA, Class I, Div. 2, Groups A,B,C,D; Class II, Div. 1, Groups E,F, G; Class III	4		

Level Measurement

Continuous level measurement – Ultrasonic transducers

EchoMax XPS

Dimensional drawings

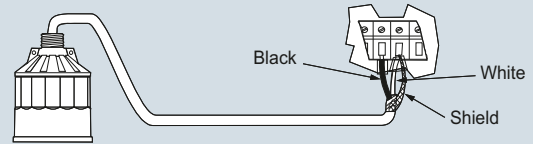


XPS ultrasonic transducer, dimensions in mm (inch)

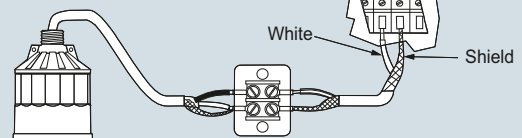
Version			
Dimension	XPS-10	XPS-15	XPS-30
A	88 mm (3.464 inch)	121 mm (4.764 inch)	175 mm (6.890 inch)
B	122 mm (4.803 inch)	132 mm (5.197 inch)	198 mm (7.795 inch)
C	According to ASME, DIN and JIS		
E	124 mm (4.882 inch)	158 mm (6.220 inch)	n/a
F	152 mm (5.984 inch)	198 mm (7.795 inch)	n/a
J	28 mm (1.1 inch)	28 mm (1.1 inch)	28 mm (1.1 inch)

Schematics

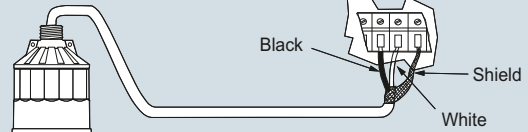
Direct connection



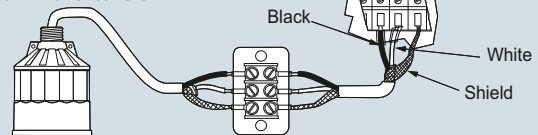
Coaxial connection



3 terminal direct*



3 terminal extension*



* For SITRANS LUT400, MultiRanger 100/200, HydroRanger 200

Mounting

Make particularly sure that the radiating face of the transducer is protected from damage. Mount the transducer so that it is above the maximum material level by at least the blanking value. On liquid applications, the transducer must be mounted so that the axis of transmission is perpendicular to the liquid surface. On solids applications, a Milltronics Easy Aimer should be used to facilitate aiming the transducer. Consider the optional temperature sensor when mounting the transducer.

Interconnection

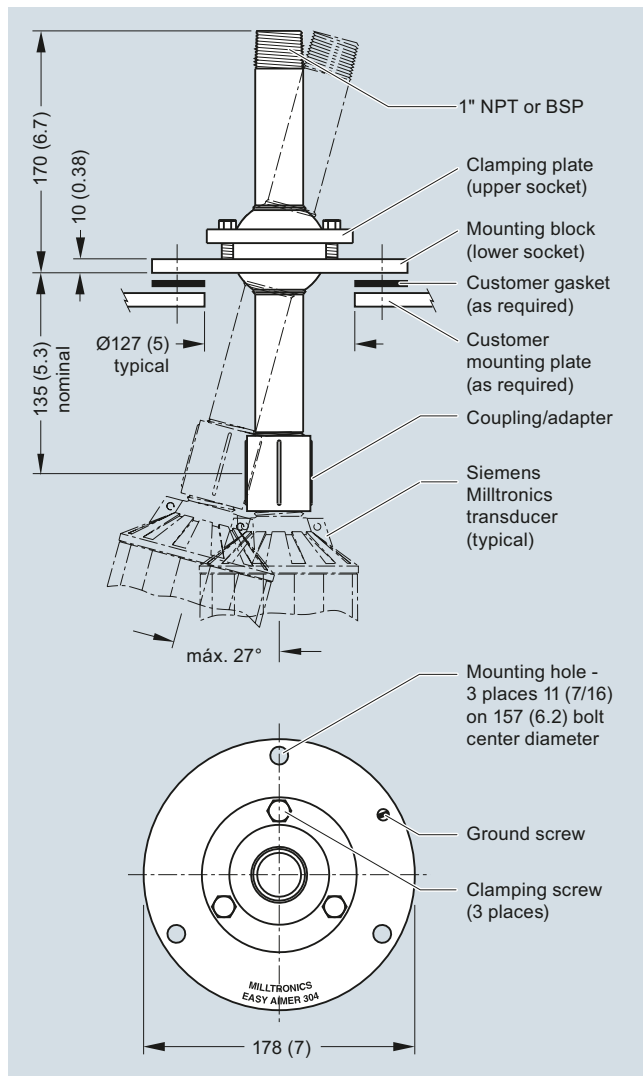
Do not route cable openly or near high voltage or current runs, contactors and SCR control drives. For optimum isolation against electrical noise, run cable separately in a grounded metal conduit. Seal all thread connections to prevent ingress of moisture.

XPS ultrasonic transducer connections

Application**EA 304 aiming device**

The Easy Aimer 304 flange is a stainless steel aiming device for alignment of Siemens ultrasonic transducers used for level measurement of bulk solids.

The sensor must be mounted aimed towards the low level draw point in the silo. The sensor can be rotated through 360° and angled at 0 to 27° off vertical. It must be mounted using an access plate with welded studs or a flange in order to isolate the mounting holes from the pressurized environment. When installed properly, the EA 304 aiming device is capable of withstanding pressures up to 0.5 bar (Europe) or 15 psi (North America). It can even be used in corrosive and aggressive environments.

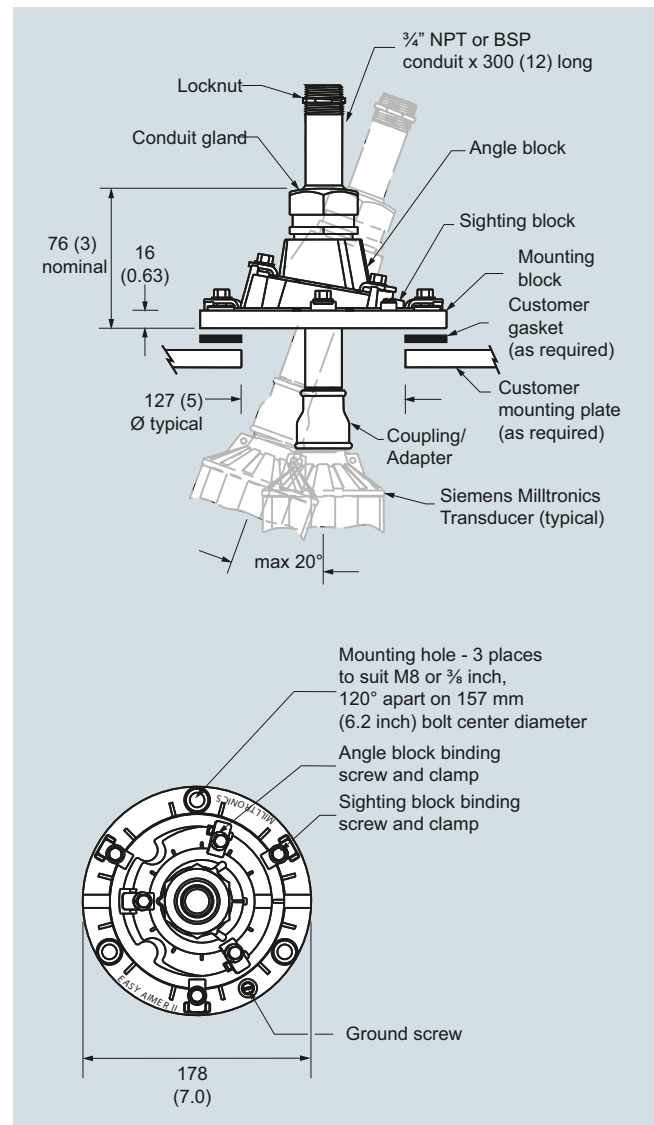
Dimensional drawings

EA 304 aiming device, dimensions in mm (inch)

Application**EA 2 aiming device**

The Easy Aimer 2 flange is a cast aluminum aiming device for alignment of Siemens ultrasonic transducers.

The flange has graduated adjustments and an adjustable insertion length. When used for applications with bulk solids, the sensor is mounted so that it is aimed towards the lower level draw point in the silo. The sensor can be rotated through 360° and angled at 0 to 20° off vertical. It must be mounted using an access plate with welded studs or a flange in order to isolate the mounting holes from the pressurized environment. When installed properly, the EA 2 aiming device is capable of withstanding pressures up to 0.5 bar (Europe) or 15 psi (North America). It can even be used in corrosive and aggressive environments.

Dimensional drawings

EA 2 aiming device, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Accessories for ultrasonic

EA aiming devices

Selection and Ordering data	Article No.
<p>Easy aimer Used on solids applications to aim transducers for optimal performance. Available in a 304 stainless steel model, or a cast aluminum model.</p>	
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings	7ML1830-1AX
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 stainless steel couplings	7ML1830-1GN
Easy Aimer 2, aluminum, BSPT conduit	7ML1830-1AL
Easy Aimer 2, aluminum, NPT with 1½" galvanized coupling ¹⁾	7ML1830-1AN
Easy Aimer 2, aluminum, NPT with 1" galvanized coupling	7ML1830-1AP
Easy Aimer 2, aluminum, NPT with ¾" x 1" PVC coupling	7ML1830-1AQ
Easy Aimer 304, BSPT conduit	7ML1830-1AS
Easy Aimer 304, NPT with 1½" coupling ¹⁾	7ML1830-1AT
Easy Aimer 304, NPT with 1" coupling	7ML1830-1AU
<p>Operating Instructions Easy Aimer 2 and 304 Operating Instructions, Multi-language Note: The Operating Instructions should be ordered as a separate line item on the order.</p> <p>This device is shipped with the Siemens Milltronics manual DVD containing the Quick Start and Operating Instructions library.</p>	7ML1998-5HG62

¹⁾ For use with XPS-30 transducers only

Application

Siemens mounting brackets permit simple, fast installation of ultrasonic transducers. These rugged, high quality mounting brackets are constructed of 304 (1.4301) stainless steel and are suitable for use indoors and outdoors. They adjust to fit almost any application, saving you the time and expense of building custom brackets. Each kit includes all mounting parts.

**FMS-200
universal box bracket system**

Mounting of units with 1 inch or 2 inch threaded connection.

Distance from sensor to wall or beam: 20 ... 31 cm (8 ... 12 inch).

The unique box design also acts as a sun shield for transducers with 1 inch threaded connections.

**FMS-210
wall mounting set**

Mounting of transducers with 1 inch threaded connection.

Distance from transducer to wall or beam: 12 ... 48 cm (5 ... 19 inch).

**FMS-220
extended wall mounting set**

Mounting of transducers with 1 inch threaded connection.

Distance from transducer to wall or beam: 32 ... 98 cm (13 ... 39 inch).

**FMS-310
floor mounting set**

Mounting of transducers with 1 inch threaded connection.

Distance from transducer to floor: 20 ... 48 cm (8 ... 19 inch).

Distance from mounting support: 5 ... 57 cm (2 ... 22 inch).

**FMS-320
extended floor mounting set**

Mounting of transducers with 1 inch threaded connection.

Distance from transducer to floor: 20 ... 48 cm (8 ... 19 inch).

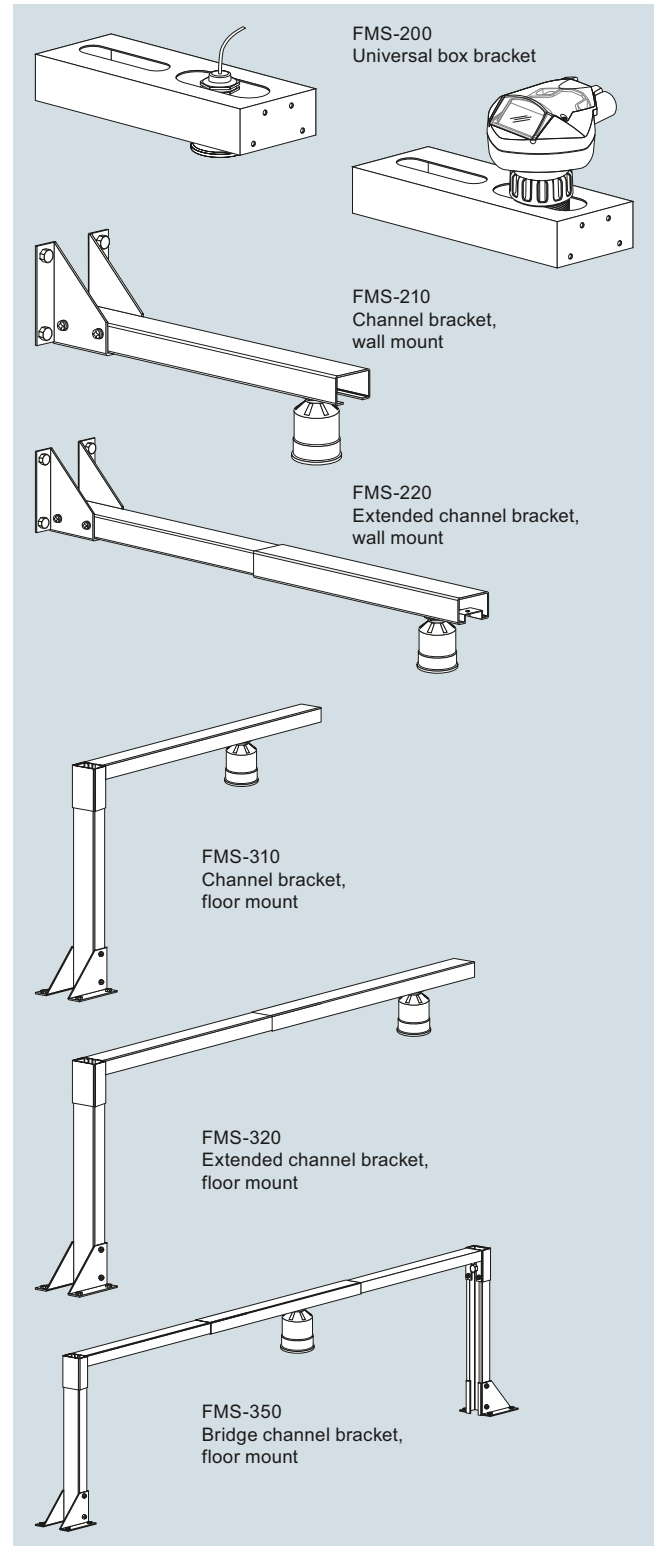
Distance from mounting support: 41 ... 108 cm (16 ... 43 inch).

**FMS-350
floor mounting set, bridge**

Mounting of transducers with 1 inch threaded connection.

Distance from transducer to floor: 20 ... 48 cm (8 ... 19 inch), anywhere along the complete width of the bridge [166 cm (65 inch)].

This kit is particularly suitable for measurements on open channels (OCM) by providing a very stable mount for the transducer above a flume or weir.

Integration

FMS mounting brackets

Level Measurement

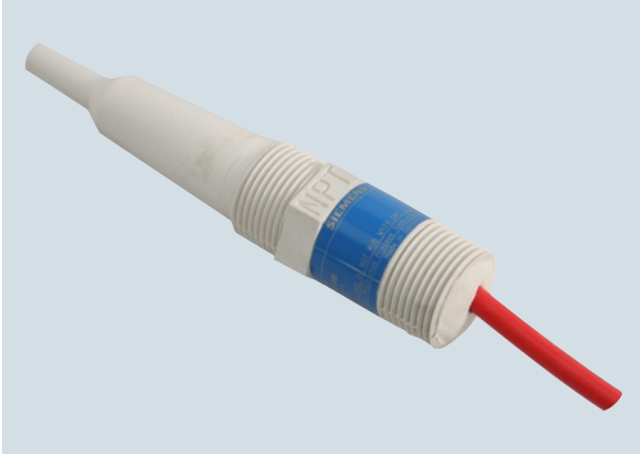
Continuous level measurement – Accessories for ultrasonic

FMS mounting brackets

Selection and Ordering data	Article No.
Mounting brackets for XPS-10 sensors	
FMS-200 universal box bracket set	7ML1830-1BK
FMS-210 wall mounting set	7ML1830-1BL
FMS-220 extended wall mounting set	7ML1830-1BM
FMS-310 floor mounting set	7ML1830-1BN
FMS-320 extended floor mounting set	7ML1830-1BP
FMS-350 floor mounting set, bridge	7ML1830-1BQ
<i>Additional Operating Instructions</i>	
FMS-200	7ML1998-5BK61
FMS-210	7ML1998-5BL61
FMS-220	7ML1998-5BM61
FMS-310	7ML1998-5BN61
FMS-320	7ML1998-5BP61
FMS-350	7ML1998-5BQ61

Note: The Operating Instructions should be ordered as a separate line item on the order.

Overview



The TS-3 temperature sensor provides an input signal for temperature compensation of specific Siemens ultrasonic level controllers.

Benefits

- Chemically resistant ETFE enclosure
- Fast response time
- Approved for use in potentially explosive atmospheres

Application

Temperature compensation is essential in applications where temperature variations of the sound medium are expected.

By installing the temperature sensor close to the sound path of the associated ultrasonic transducer, a signal representative of the sound medium's ambient temperature is obtained. The temperature sensor should not be mounted in direct sunlight.

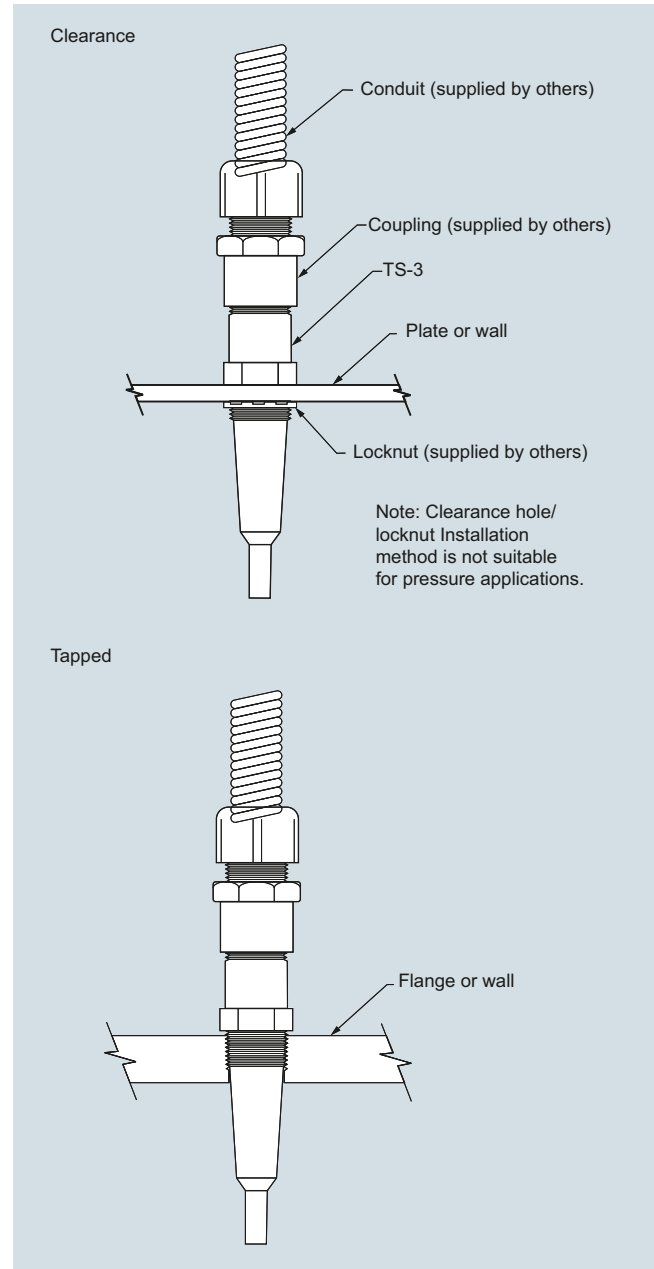
The TS-3 is used in conjunction with ultrasonic transducers that do not have an integral temperature sensor. It is also recommended in cases where the integral temperature sensor of the transducer cannot be used.

The following conditions are typical for use of the TS-3 sensor: where a fast reaction to temperature variations is required, where a flanged ultrasonic transducer is used, or where high temperatures are encountered.

The TS-3 is not compatible with devices using the TS-2 or LTS-1 temperature sensors. Refer to the associated controller manual for more details.

- Key Applications: For use in applications where temperature sensor measurement from transducer does not accurately represent vessel temperature. Used for applications requiring quick temperature response (open channel monitoring).

Design



TS-3 temperature sensor

Level Measurement

Continuous level measurement – Accessories for ultrasonic

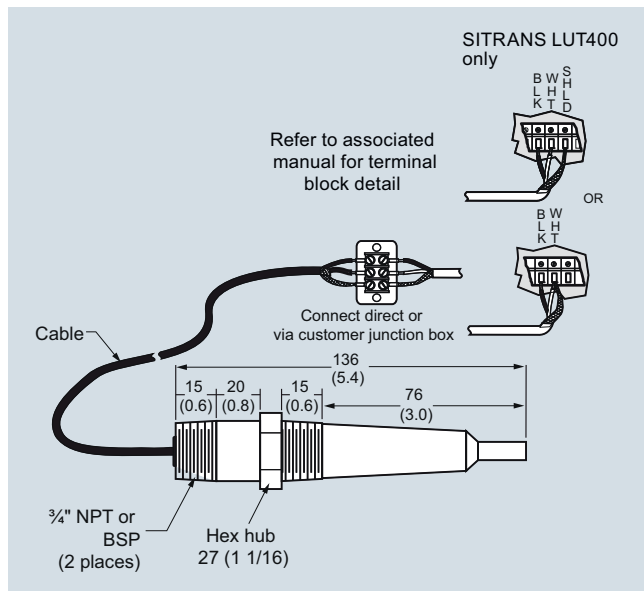
TS-3 temperature sensor

Technical specifications

Mode of operation	
Measuring principle	Temperature sensor
Input	
Measuring range	-40 ... +100 °C (-40 ... +212 °F)
Output	
Response time	
• Forced circulation (temperature variation: 63 %)	55 s
• Flange, forced circulation	90 s
• Natural convection	150 s
Rated operating conditions	
• Installation instructions	Mounted indoors/outdoors, but not exposed to direct sunlight
• Pressure	Max. 4 bar (60 psi/400 kPa)
Design	
Material (enclosure)	ETFE ¹⁾
Cable connection	2-core, 0.5 mm ² (20 AWG), shielded, silicone sheath
Process connection	¾" NPT [(Taper), ANSI/ASME B1.20.1] R ¾" [(BSPT), EN 10226], totally encapsulated
Certificates and approvals	
	CE, IEC Ex, FM, CSA, ATEX

¹⁾ ETFE is a fluoropolymer inert to most chemicals. For exposure to specific environments, check the chemical compatibility charts before installing the TS-3 in your application.

Dimensional drawings



TS-3 temperature sensor, dimensions in mm (inch)

Selection and Ordering data

TS-3 temperature sensor

TS-3 provides an input signal for temperature compensation of specific Siemens ultrasonic level controllers.

Compensation is essential in applications where variation in temperature of the sound medium is expected.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Cable length

1 m (3.28 ft)	1
5 m (16.40 ft)	2
10 m (32.81 ft)	3
30 m (98.43 ft)	4
50 m (164.04 ft)	5
70 m (229.66 ft)	6
90 m (295.28 ft)	7

Process connection

¾" NPT [(Taper), ANSI/ASME B1.20.1]	A
R ¾" [(BSPT), EN 10226]	B

Approvals

CE, ATEX, IEC Ex	3
CE, ATEX, IEC Ex	4

Operating Instructions

English

A5E32337739

German

A5E34990011

Note: The Operating Instructions should be ordered as a separate line item on the order.

This device is shipped with the Siemens Milltronics manual DVD containing ATEX Quick Starts and Operating Instructions.

Accessories

¾" NPT locknut, aluminum

7ML1930-1BE

Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77 inch) for fastening on sensors

7ML1930-1BJ

Article No.

7ML1813-

B

1

2

3

4

5

6

7

A

B

3

4

Overview

Radar measurement technology is non-contacting and low maintenance. Because microwaves require no carrier medium, they are virtually unaffected by the process atmosphere (vapor, pressure, dust, or temperature extremes). Siemens offers a variety of models to meet the specific needs of your application.

SITRANS Probe LR is a 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage vessels with nominal pressure and temperature, to a range of 20 m (66 ft).

SITRANS LR200 is a 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature, pressure, agitation, and turbulence to a range of 20 m (65 ft).

SITRANS LR250 is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, corrosive or aggressive materials, to a range of 20 m (66 ft). Ideal for small vessels and low dielectric media.

SITRANS LR260 is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of solids in silos to a range of 30 m (98.4 ft). Ideal for applications with extreme dust and high temperatures to 200 °C (392 °F) and liquids in vessels.

SITRANS LR460 is a 4-wire, 24 GHz FMCW radar level transmitter with extremely high signal to noise ratio and advanced signal processing for continuous monitoring of solids up to 100 m (328 ft). It is ideal for measurement in extreme dust.

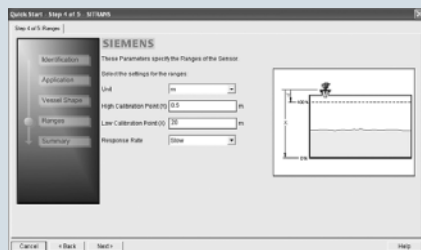
SITRANS LR560 2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids in silos to a range of 100 m (329 ft).

Auto False-Echo Suppression

SITRANS LR instruments offer the unique advantage of Process Intelligence signal processing technology. This in-depth knowledge and experience is built into the software's advanced algorithms to provide intelligent processing of echo profiles. The result is repeatable, fast and reliable measurement.

A special feature of SITRANS radar devices is Auto False-Echo Suppression, an echo processing technique that automatically detects and suppresses false echoes from vessel obstructions. You can implement this feature using two parameters on the local interface or SIMATIC PDM communicating over HART or PROFIBUS PA.

Local display interface – graphically displays echo profiles and diagnostic information (available with LR200, LR250, LR260 and LR560)
Quick to configure – Quick Start Wizard via SIMATIC PDM guides you during setup (available with LR200, LR250, LR260, LR460, LR560)



Mode of operation

Principle of Operation

Radar measurement technology measures the time of flight from the transmitted signal to the return signal. From this time, distance measurement and level are determined.

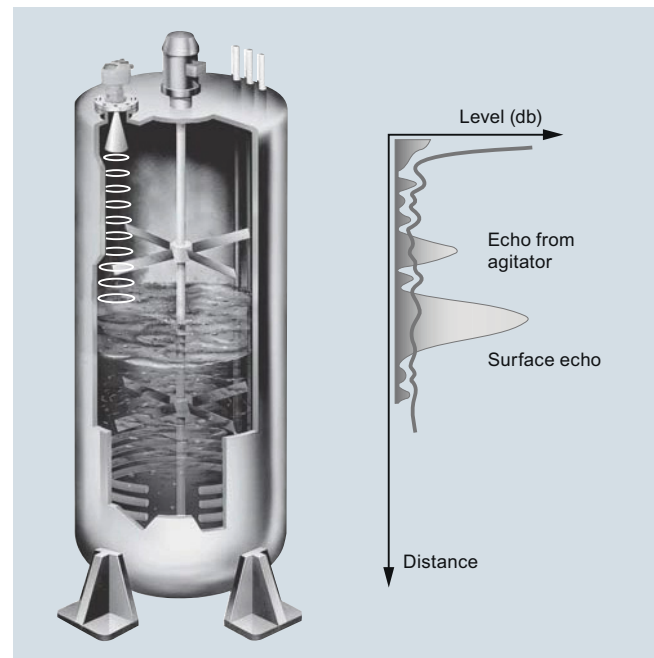
Unlike ultrasonic measurement, radar technology does not require a carrier medium and travels at the speed of light (300 000 000 m/s). Most industrial radar devices operate from 6 to 26 GHz.

Siemens offers pulse radar transmitters (SITRANS Probe LR, SITRANS LR200, SITRANS LR250, SITRANS LR260) and FMCW (Frequency Modulated Continuous Wave) radar transmitters (SITRANS LR460, SITRANS LR560).

Pulse radar emits a microwave pulse from the antenna at a fixed repetition rate that reflects off the interface between the two materials with different dielectric constants (the atmosphere and the material being monitored). The echo is detected by a receiver and the transmit time is used to calculate level.

Reflected echoes are digitally converted to an echo profile. The profile is analyzed to determine the distance from the material surface to the reference point on the instrument.

FMCW (Frequency Modulated Continuous Wave) radar devices send microwaves to the surface of the material. The wave frequency is modulated continuously. At the same time, the receiver is also receiving continuously and the difference in frequency between the transmitter and the receiver is directly proportional to the distance to the material.



Radar operation in a reactor vessel

Level Measurement

Continuous level measurement – Radar transmitters

Radar transmitters

Technical specifications

Radar Selection Guide

Criteria	SITRANS Probe LR	SITRANS LR200	SITRANS LR250	SITRANS LR260	SITRANS LR460	SITRANS LR560
Typical industries	Chemicals, petrochemicals, water/waste-water, drilling mud	Chemicals, petrochemicals, aluminum, wastewater	Chemicals, petrochemicals, and oil and gas, mining, marine, food and beverage, and pharmaceutical	Cement, power generation, petrochemical, food processing, mineral processing, mining	Cement, power generation, food processing, mineral processing, mining	Cement, power generation, food processing, mineral processing, mining
Typical applications	Liquids, storage vessels, wet wells, and drilling mud tanks	Liquids, process vessels with agitators, build-up, and high temperatures	Liquids, storage and process vessels with agitators, vaporous liquids, high temperatures, low dielectric media, and crude oil produced water	Cement, plastics, grain, flour, coal, liquids < 20 m, and low dielectric liquids < 30 m	Cement, fly ash, grain, coal, flour, plastics	Cement, fly ash, grain, coal, flour, plastics
Range	0.3 ... 20 m (1 ... 65 ft)	0.4 ... 20 m (1.3 ... 65 ft)	50 mm (2 inch) from end of horn to 20 m (65 ft), horn dependent	30 m (98.4 ft)	100 m (328 ft)	40 m (131 ft) 100 m (328 ft)
Frequency	5.8 GHz (North America 6.3 GHz)	5.8 GHz (North America 6.3 GHz)	K-band (25.0 GHz)	K-band (25.0 GHz)	24 ... 25 GHz FMCW	78 ... 79 GHz
Performance accuracy	0.1 % of range or 10 mm (0.4 inch)	0.1 % of range or 10 mm (0.4 inch)	≤ 5 mm (0.02 inch)	25 mm (1 inch) from minimum detectable distance to 300 mm (11.8 inch) Remainder of range = 10 mm (0.39 inch) or 0.1 % of span (whichever is greater)	0.25 %	0.25 %
Temperature	Ambient: -40 ... +80 °C (-40 ... +176 °F) Process: -40 ... +80 °C (-40 ... +176 °F)	Ambient: -40 ... +80 °C (-40 ... +176 °F) Process: -40 ... +200 °C (-40 ... +392 °F), dependent on antenna type	Ambient: -40 ... +80 °C (-40 ... +176 °F) Process: -40 ... +200 °C (-40 ... +392 °F) dependent on antenna type	Ambient: -40 ... +80 °C (-40 ... +176 °F) Process: -40 ... +200 °C (-40 ... +392 °F) dependent on antenna type	Ambient: +65 °C (+149 °F) Process: +200 °C (+392 °F)	Ambient: -40 ... +80 °C (-40 ... +176 °F) Process: -40 ... +100 °C (-40 ... 212 °F) Optional: +200 °C (+392 °F)
Output/communications/remote configuration and diagnostics	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • SIMATIC PDM 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • PROFIBUS PA • SIMATIC PDM • AMS • SITRANS DTM/FDT for PACTware, Fieldcare, etc. 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • PROFIBUS PA • FOUNDATION Fieldbus • SIMATIC PDM • AMS • SITRANS DTM/FDT for PACTware, Fieldcare, etc. 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • PROFIBUS PA • SIMATIC PDM 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • PROFIBUS PA • SIMATIC PDM 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • PROFIBUS PA • FOUNDATION Fieldbus • SIMATIC PDM • AMS • SITRANS DTM/FDT for PACTware, Fieldcare, etc.
Power	<ul style="list-style-type: none"> • 24 V DC nominal • Loop powered 	<ul style="list-style-type: none"> • 24 V DC nominal • Loop powered 	<ul style="list-style-type: none"> • 24 V DC nominal • Loop powered 	<ul style="list-style-type: none"> • 24 V DC nominal • Loop powered 	<ul style="list-style-type: none"> • 100 ... 230 V AC, ±15 %, 50/60 Hz, 6 W • 24 V DC, +25/-20 %, 6 W 	<ul style="list-style-type: none"> • 24 V DC nominal • Loop powered
Approvals	CE, RCM, Lloyds Register of Shipping, ABS, FCC, Industry Canada, R&TTE ATEX, CSA, FM, INMETRO, GOST-R, IECEX, ANZEx, TIIS	CE, RCM, Lloyds Register of Shipping, ABS, FCC, Industry Canada, R&TTE ATEX, CSA, FM, INMETRO, GOST-R, IECEX, ANZEx, TIIS, NEPSI	CE, RCM, Lloyds Register of Shipping, ABS, BV, FCC, Industry Canada, R&TTE ATEX, CSA, FM, INMETRO, GOST-R, IECEX, TIIS, NEPSI Functional safety SIL-2, EHEDG, 3-A, USP Class VI	CE, RCM, FCC, Industry Canada, R&TTE ATEX, CSA, FM, INMETRO, GOST, IECEX	CE, RCM, FCC, Industry Canada, R&TTE ATEX, CSA, FM, INMETRO, IECEX, GOST	CE, RCM, FCC, Industry Canada, R&TTE ATEX, CSA, FM, INMETRO, IECEX, NEPSI, GOST

Application

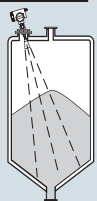
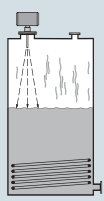
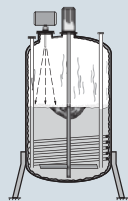
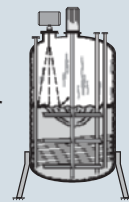
SIEMENS

Radar Application Questionnaire

Customer information

Contact: _____ Prepared By: _____
 Company: _____ Date: _____
 Address: _____ Notes on the Application: _____
 City: _____ Country: _____
 Zip/Postal Code: _____ Phone: () _____
 E-mail: _____ Fax: () _____

Vessel Information

Storage Solids  Storage Liquids  Process  Reactor 

Sketch attached

Area safety classification: (specify code required) _____

Height: _____ m/ft Diameter: _____ m/ft Filling method: _____

Top: Flat Parabolic Conical **Atmosphere:** (indicate all that apply) Foam Dust Vapor Steam Deposit (build-up) Pressure: _____ Normal: _____ Maximum (relief): _____

Mounting connection (specify type) _____

Distance to sidewall: _____ cm/inch

Mounting connection maximum temperature: _____ °C/°F

Max. temperature at electronics: _____ °C/°F

Critical Information
 Nozzle Length: _____ cm/inch
 Nozzle Diameter: _____ cm/inch

Stilling well or Still Pipe mounting: Yes No Stilling well diameter: _____ cm/inch

Material

Material being measured: _____ Liquid Solid Liquefied gas

Material temperature: Norm: _____ °C/°F Max: _____ °C/°F

Material surface: Flat Tu Agitated Vortex Dielectric constant: $\epsilon_r < 3$ $\epsilon_r > 3$

Installation

Power available: _____

Communications:

HART /4 ... 20 mA
 PROFIBUS PA
 FOUNDATION Fieldbus None

Products recommended: _____

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS Probe LR

Overview



SITRANS Probe LR is a 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage vessels with nominal pressure and temperature, to a range of 20 m (66 ft).

Benefits

- Uni-Construction polypropylene rod antenna standard
- Easy installation and simple start-up
- Programming using infrared Intrinsically Safe handheld programmer, SIMATIC PDM or HART handheld communicator
- Communication using HART
- Process Intelligence signal processing
- Extremely high signal-to-noise ratio
- Auto False-Echo Suppression of false echoes

Application

The Probe LR is ideal for applications with chemical vapors, temperature gradients, vacuum or pressure, such as simple chemical storage or water treatment vessels. SITRANS Probe LR has a range of 0.3 to 20 m (1 to 65 ft).

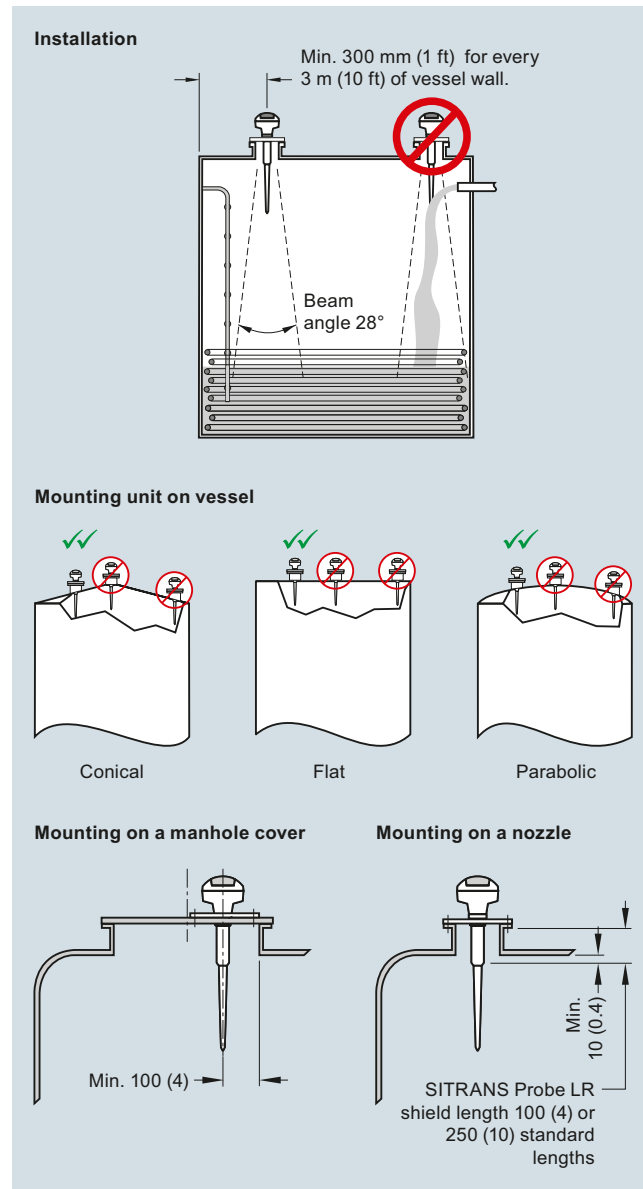
Probe LR is designed for safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid. It has a standard Uni-Construction polypropylene rod antenna that offers excellent chemical resistance and is hermetically sealed. The Uni-Construction antenna includes an internal, integrated shield that eliminates vessel nozzle interference.

SITRANS Probe LR incorporates Process Intelligence signal processing. The Probe LR also has a high signal-to-noise ratio leading to improved reliability.

Start-up is easy with as few as two parameters for basic operation. Programming is simple using SIMATIC PDM, HART handheld communicator or the Intrinsically Safe handheld programmer.

- Key Applications: chemical storage, wastewater wet well, and drilling mud

Configuration



SITRANS Probe LR installation, dimensions in mm (inch)

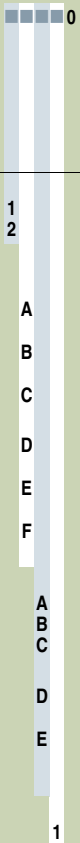
Technical specifications

Mode of operation		Power supply	
Measuring principle	Pulse radar level measurement		<ul style="list-style-type: none"> Nominal 24 V DC with max. 550 Ω, maximum 30 V DC 4 ... 20 mA
Frequency	5.8 GHz (North America 6.3 GHz)	Certificates and approvals	
Measuring range	0.3 ... 20 m (1.0 ... 65 ft)	General	CSA _{US/CA} , CE, FM, RCM
Output		Marine	<ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Type Approval
Analog output	4 ... 20 mA	Radio	FCC, Industry Canada and European (R&TTE), RCM
Accuracy	± 0.02 mA	Hazardous	
Span	Proportional or inversely proportional	<ul style="list-style-type: none"> Intrinsically Safe (Brazil) Intrinsically Safe (Canada) 	<ul style="list-style-type: none"> INMETRO Ex ia IIC T4 Ga CSA Class I, Div.1, Groups A,B,C,D; Class II, Div. 1, Group G; Class III ATEX II 1G EEx ia IIC T4 IECEX Ex ia IIC T4 GOST-R Ex ia FM Class I, Div.1, Groups A,B,C,D; Class II, Div. 1, Groups E,F, G; Class III
Communications	HART	<ul style="list-style-type: none"> Intrinsically Safe (Europe) Intrinsically Safe (International) Intrinsically Safe (Russia) Intrinsically Safe (USA) 	
Performance (reference conditions)		Programming	
Accuracy	± the greater of 0.1 % of range or 10 mm (0.4 inch)	Handheld programmer	HART communicator 375
Influence of ambient temperature	0.003 %/K	PC	SIMATIC PDM
Repeatability	± 5 mm (2 inch)	Intrinsically safe Siemens handheld programmer (optional)	Infrared receiver
Fail-safe	mA signal programmable as high, low or hold (LOE)	<ul style="list-style-type: none"> Approvals (handheld programmer) 	<ul style="list-style-type: none"> ATEX II 1G EEx ia IIC T4 CSA and FM Class I, Div. 1, Groups A,B,C,D, T6 at max. ambient
Rated operating conditions		Display (local)	Multi-segment alphanumeric liquid crystal with bar graph (representing level) available in four languages
Installation conditions			
<ul style="list-style-type: none"> Location 	Indoor/outdoor		
Ambient conditions (enclosure)			
<ul style="list-style-type: none"> Ambient temperature Installation category Pollution degree 	-40 ... +80 °C (-40 ... +176 °F) I 4		
Medium conditions			
Dielectric constant ϵ_r	$\epsilon_r > 1.6$ (for $\epsilon_r < 3$, use stillpipe)		
Vessel temperature	-40 ... +80 °C (-40 ... +176 °F)		
Vessel pressure	3 bar g (43.5 psi g)		
Design			
Enclosure			
<ul style="list-style-type: none"> Body construction Lid construction Cable inlet 	PBT (Polybutylene Terephthalate) PEI (Polyether Imide) 2 x M20x1.5 or 2 x 1/2" NPT with adapter		
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68		
Weight	1.97 kg (4.35 lb)		
Antenna			
<ul style="list-style-type: none"> Material Dimensions 	Polypropylene rod, hermetically sealed construction Standard 100 mm (4 inch) shield for maximum 100 mm (4 inch) nozzle or optional 250 mm (10 inch) long shield		
Process connections	1 1/2" NPT [(Taper), ANSI/ASME B1.20.1] R 1 1/2" [(BSPT), EN 10226] G 1 1/2" [(BSPP), EN ISO 228-1]		

Level Measurement

Continuous level measurement – Radar transmitters

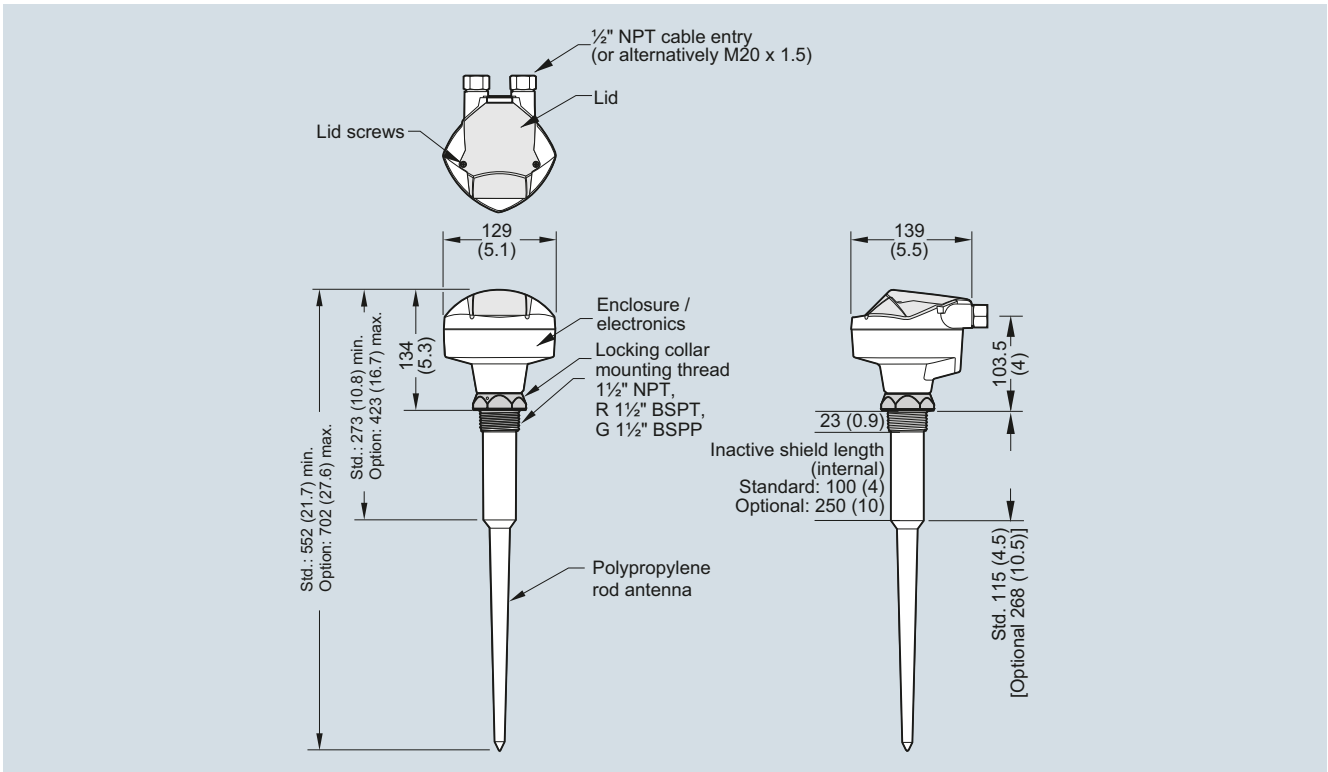
SITRANS Probe LR

Selection and Ordering data	Article No.
SITRANS Probe LR 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage vessels with nominal pressure and temperature, to a range of 20 m (66 ft). Max. 3 bar g (43.5 psi g) pressure and 80 °C (176 °F) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5430- 
Enclosure/Cable inlet Plastic, (PBT), 2 x 1/2" NPT Plastic, (PBT), 2 x M20x1.5	1 2
Antenna type/Material - (max. 3 bar and 80 °C) Polypropylene Antenna 1 1/2" NPT [(Taper), ANSI/ASME B1.20.1], comes with integral 100 mm shield R 1 1/2" [(BSPT), EN 10226], comes with integral 100 mm shield G 1 1/2" [(BSPP), EN ISO 228-1], comes with integral 100 mm shield 1 1/2" NPT [(Taper), ANSI/ASME B1.20.1], comes with integral 250 mm shield R 1 1/2" [(BSPT), EN 10226], comes with integral 250 mm shield G 1 1/2" [(BSPP), EN ISO 228-1], comes with integral 250 mm shield	A B C D E F
Approvals General Purpose, CE, R&TTE, RCM General Purpose, CSA _{US/C} , FM, FCC CSA Class I, Div. 1, Groups A, B, C, D, Class II, Div. 1 Group G, Class III, FCC, Intrinsically Safe FM, Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Intrinsically Safe IECEx Ex ia IIC T4; ATEX II 1G EEx ia IIC T4, R&TTE, RCM, Intrinsically Safe; INMETRO Ex ia IIC T4 Ga; GOST-R	A B C D E
Communication/Output 4 ... 20 mA, HART	1

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

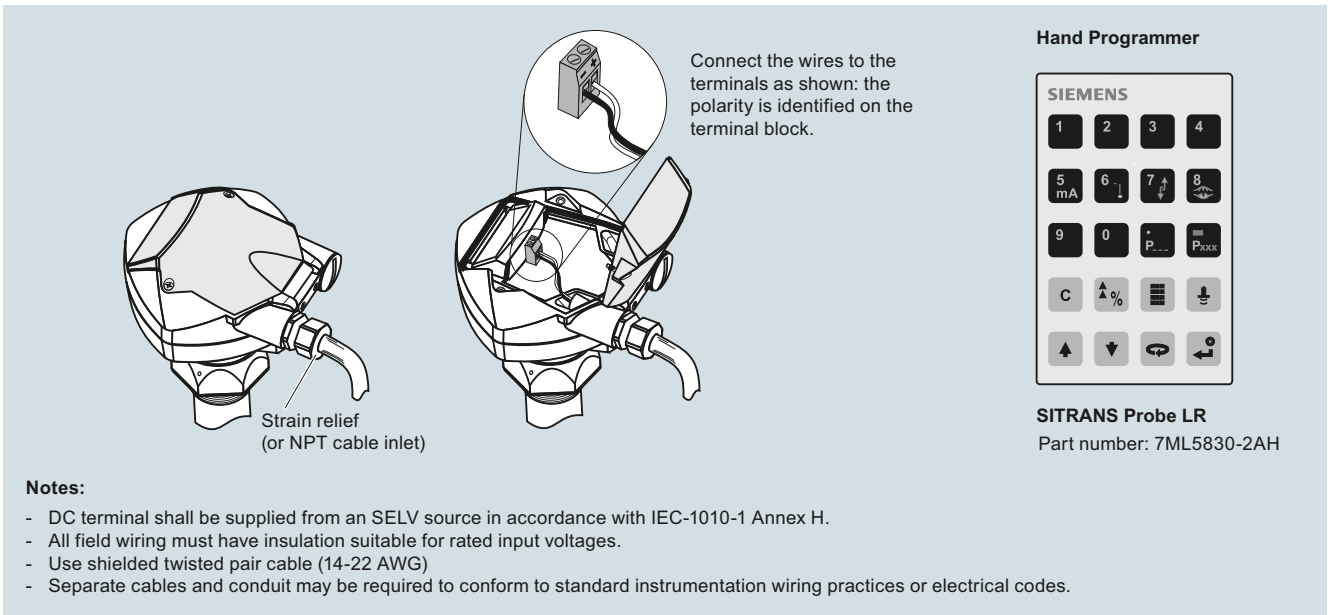
Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: ◆ Y15 Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 ◆ C11	
Operating Instructions English French Spanish German Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. A5E32337711 7ML1998-5HR11 7ML1998-5HR21 A5E34957879
Additional Operating Instructions Multi-language Quick Start manual	A5E32106153
Accessories Handheld programmer, Intrinsically Safe, ATEX II 1G, Ex ia HART modem/USB (for use with a PC and SIMATIC PDM) One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F) SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7 For applicable back up point level switch - see point level measurement section	7ML5830-2AH 7MF4997-1DB 7ML1930-1AP 7ML5741-... 7ML5740-... 7ML5744-... 7ML5750-...
Spare parts Plastic lid For applicable back up point level switch - see point level measurement section ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	7ML1830-1KB

Dimensional drawings



SITRANS Probe LR, dimensions in mm (inch)

Schematics



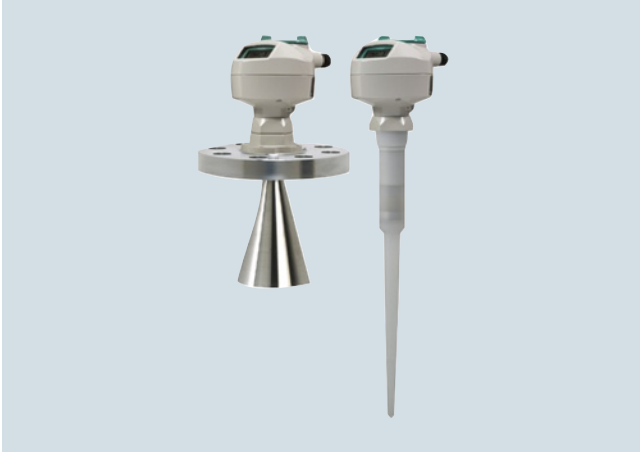
SITRANS Probe LR connections

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR200

Overview



SITRANS LR200 is a 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature, pressure, agitation, and turbulence to a range of 20 m (65 ft).

Benefits

- Graphical local user interface (LUI) makes operation simple with plug-and-play setup using the intuitive Quick Start Wizard
- LUI displays echo profiles for diagnostic support
- Communication using HART or PROFIBUS PA
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or SIMATIC PDM

Application

SITRANS LR200's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid. It also features a built-in alphanumeric display in four languages.

The SITRANS LR200 has a standard Uni-Construction polypropylene rod antenna that offers excellent chemical resistance and is hermetically sealed. The Uni-Construction antenna features an internal, integrated shield that eliminates vessel nozzle interference.

Start-up is easy with as few as two parameters for basic operation. Installation is simplified as the electronics are mounted on a rotating head that swivels, allowing the instrument to line up with conduit or wiring connections or simply to adjust the position for easy viewing. SITRANS LR200 features Process Intelligence signal-processing technology for superior reliability.

- Key Applications: liquid process vessels with agitators, vaporous liquids, high temperatures, asphalt, digesters

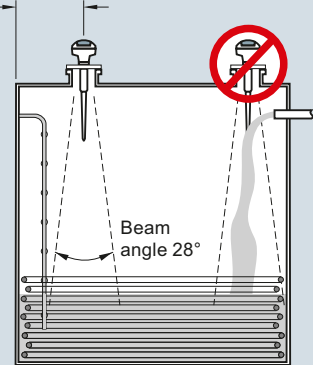
Configuration

Installation

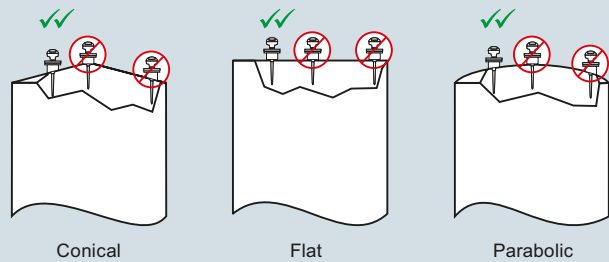
Min. 300 mm (1 ft) for every 3 m (10 ft) of vessel wall.

Note:

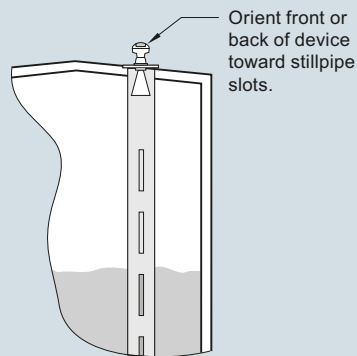
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- Beam angle for horn antenna dependent on horn size
- The peak energy density is directly in front of and in line with the rod antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



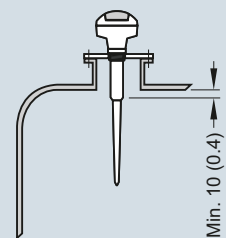
Mounting unit on vessel



Mounting unit on stilling well



Mounting on a nozzle



SITRANS LR200 installation, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	Radar level measurement
Frequency	5.8 GHz (North America 6.3 GHz)
Measuring range	0.3 ... 20 m (1.0 ... 65 ft)
Output	
<ul style="list-style-type: none"> Analog output Accuracy Span Communications 	4 ... 20 mA ± 0.02 mA Proportional or inversely proportional HART Optional: PROFIBUS PA (Profile 3.0, Class B) Programmable as high, low or hold (Loss of Echo)
<ul style="list-style-type: none"> Fail-safe 	
Performance (according to reference conditions IEC60770-1)	
<ul style="list-style-type: none"> From end of antenna to 600 mm: Remainder of range: 	40 mm (1.57 inch) 10 mm (0.4 inch) or 0.1 % of span (whichever is greater)
Rated operating conditions	
Installation conditions <ul style="list-style-type: none"> Location 	Indoor/outdoor
Ambient conditions (enclosure) <ul style="list-style-type: none"> Ambient temperature Installation category Pollution degree 	-40 ... +80 °C (-40 ... +176 °F) I 4
Medium conditions	
<ul style="list-style-type: none"> Dielectric constant ϵ_r Vessel temperature and pressure 	$\epsilon_r > 1.6$ (for $\epsilon_r < 3$, use stillpipe) Varies with connection type; see Pressure/Temperature curves for more information
Design	
Enclosure <ul style="list-style-type: none"> Material Cable inlet 	Aluminum, polyester powder coated 2 x M20x1.5 or 2 x 1/2" NPT with adapter
Degree of protection	Type 4X/NEMA 4X, Type 6/ NEMA 6, IP67, IP68
Weight	< 2.82 kg (6.21 lb) (polypropylene rod antenna)
Display (local)	Multi-segment alphanumeric liquid crystal with bar graph (representing level) available in four languages
Antenna <ul style="list-style-type: none"> Material 	Polypropylene rod, hermetically sealed construction, optional PTFE
<ul style="list-style-type: none"> Dimensions 	Standard 100 mm (4 inch) shield for maximum 100 mm (4 inch) nozzle, or optional 250 mm (10 inch) long shield
<ul style="list-style-type: none"> Optional rods and horn 	Refer to SITRANS LR200 Antennas for optional rods and horns
Process connections	
<ul style="list-style-type: none"> Process connection 	1 1/2" NPT [(Taper), ANSI/ASME B1.20.1] R 1 1/2" [(BSPT), EN 10226], or G 1 1/2" [(BSPP), EN ISO 228-1] (polypropylene rod antenna)
<ul style="list-style-type: none"> Flange connection 	Refer to SITRANS LR200 Antennas for more connections

Power supply	
4 ... 20 mA/HART <ul style="list-style-type: none"> General Purpose, Non-incendive, Intrinsically Safe Flame proof, Increased safety, Explosion proof PROFIBUS PA	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω Nominal 24 V DC (max. 30 V DC) with max. 250 Ω <ul style="list-style-type: none"> 10.5 mA Per IEC 61158-2
Certificates and approvals	
General	CSA _{US/C} , CE, FM, RCM
Marine	<ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Type Approval
Radio	FCC, Industry Canada and European (R&TTE), RCM
Hazardous <ul style="list-style-type: none"> Intrinsically Safe (Brazil) Explosion Proof (Canada/USA) 	INMETRO Ex ia IIC T4 Ga CSA/FM, Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, T4 CSA/FM, Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, T4
<ul style="list-style-type: none"> Intrinsically Safe (Canada/USA) 	CSA/FM, Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, T4
<ul style="list-style-type: none"> Non-incendive (USA) 	FM, Class I, Div. 2, Groups A, B, C, D, T5
<ul style="list-style-type: none"> Flame Proof/Increased Safety (China) Flame Proof (Europe) 	NEPSI Ex d mb ia IIC T4/ Ex e mb ia IIC T4 ATEX II 1/2 G Ex d mb ia IIC T4 Ga/Gb
<ul style="list-style-type: none"> Increased Safety (Europe) 	ATEX II 1/2 G Ex e mb ia IIC T4 Ga/Gb
<ul style="list-style-type: none"> Intrinsically Safe (Europe) Intrinsically Safe (International) Intrinsically Safe (Russia) 	ATEX II 1G Ex ia IIC T4 IECEx Ex ia IIC T4 GOST-R Ex ia
Programming	
<ul style="list-style-type: none"> Intrinsically Safe Siemens handheld programmer - Approvals for handheld programmer 	Infrared receiver IS model: ATEX II 1GD Ex ia IIC T4 Ga Ex iaD 20 T135 °C T _a = -20 ... +50 °C CSA/FM Class I, II, and III, Div. 1, Groups A, B, C, D, E, F, G, T6 T _a = +50 °C
<ul style="list-style-type: none"> Handheld communicator PC 	HART communicator 375 <ul style="list-style-type: none"> SIMATIC PDM AMS
<ul style="list-style-type: none"> Display (local) 	Multi-segment alphanumeric liquid crystal with bar graph (representing level) available in four languages

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR200

Selection and Ordering data

SITRANS LR200, Uni-Construction polypropylene rod antenna version

2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature and pressure, to a range of 20 m (66 ft).

Max. 3 bar g (43.5 psi g) pressure and 80 °C (176 °F)

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Enclosure/Cable inlet

Aluminum, epoxy painted
2 x 1/2" NPT
2 x M20x1.5

Polypropylene antenna type - (Max. 3 Bar pressure and 80 °C)

1 1/2" NPT [(Taper), ANSI/ASME B1.20.1], c/w integral 100 mm shield
R 1 1/2" [(BSPT), EN 10226], c/w integral 100 mm shield
G 1 1/2" [(BSPP), EN ISO 228-1], c/w integral 100 mm shield

1 1/2" NPT [(Taper), ANSI/ASME B1.20.1], c/w integral 250 mm shield
R 1 1/2" [(BSPT), EN 10226], c/w integral 250 mm shield
G 1 1/2" [(BSPP), EN ISO 228-1], c/w integral 250 mm shield

Approvals

General Purpose, CE, R&TTE, RCM
General Purpose, CSA, FM, Industry Canada, FCC
Intrinsically Safe, CSA Class I, II, Div. 1, Groups A, B, C, D, E, F, G, Industry Canada

Intrinsically Safe, FM Class I, II, Div. 1, Groups A, B, C, D, E, F, G, FCC
Intrinsically Safe, IECEx/ATEX II 1G Ex ia IIC T4, INMETRO Ex ia IIC T4, CE, R&TTE, RCM; GOST-R Non incandive, FM Class I, Div. 2, Groups A, B, C, D, FCC¹⁾

Increased Safety, ATEX II 1/2G Ex e mb ia IIC T4 Ga/Gb, CE, R&TTE, RCM; GOST-R²⁾
Flame Proof, ATEX II 1/2G Ex d mb ia IIC T4 Ga/Gb, CE, R&TTE, RCM; GOST-R³⁾
Explosion Proof, CSA/FM Class I, II, III, Groups A, B, C, D, E, F, G, Industry Canada, FCC¹⁾³⁾

Communication/Output

PROFIBUS PA
4 ... 20 mA, HART, start-up at < 3.6 mA

¹⁾ Available with enclosure option 2 only

²⁾ Available with enclosure option 3 only

³⁾ Available with communication option 3 only

Article No.

7ML5422-

0

2

3

A

B

C

D

E

F

A

B

C

D

E

F

2

3

Selection and Ordering data

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification (max. 27 characters); specify in plain text

Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000

Namur NE43 compliant, device preset to failsafe < 3.6 mA¹⁾

Operating Instructions for HART/mA device

English

German

Note: The Operating Instructions should be ordered as a separate line item on the order.

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Operating Instructions for PROFIBUS PA device

English

German

Note: The Operating Instructions should be ordered as a separate line item on the order.

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Accessories

Handheld programmer, Intrinsically safe, EEx ia
HART modem/USB
(for use with a PC and SIMATIC PDM)

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART²⁾

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA²⁾

One general purpose polymeric cable gland M20x1.5, rated -20 ... +80 °C (-40 ... +176 °F)

SITRANS RD100, loop powered display - see Chapter 7

SITRANS RD200, universal input display with Modbus conversion - see Chapter 7

SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7

SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7

For applicable back up point level switch - see point level measurement section

¹⁾ Available with communication option 3 only

²⁾ Product shipped with plastic cable gland, rated to -20 °C.
If -40 °C rating required, then metallic cable gland is recommended.

Order code

Y15

C11

N07

Article No.

A5E32337676

A5E34942758

A5E31993614

A5E32337680

A5E34942820

A5E32153438

7ML1930-1BK

7MF4997-1DB

7ML1930-1AP

7ML1930-1AQ

7ML1930-1AM

7ML5741-...

7ML5740-...

7ML5744-...

7ML5750-...

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LR200, Flange Adapter/PTFE Rod Antenna Version 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature and pressure, to a range of 20 m (66 ft). Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5423-	SITRANS LR200, Flange Adapter/PTFE Rod Antenna Version 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature and pressure, to a range of 20 m (66 ft). 2 x 1/2" NPT 2 x M20x1.5	7ML5423-
Antenna material (uses antenna adapter) PTFE, uses antenna adapter and additional process connection below	1	Communication/Output PROFIBUS PA 4 ... 20 mA, HART, start-up at < 3.6 mA	2 3 B C
Process connection (refer to Pressure/Temperature curves, page 4/208) Flanges (316L stainless steel) DN 50 PN 16, Type A, flat faced DN 80 PN 16, Type A, flat faced DN 100 PN 16, Type A, flat faced DN 150 PN 16, Type A, flat faced 2" ASME 150 lb, flat faced 3" ASME 150 lb, flat faced 4" ASME 150 lb, flat faced 6" ASME 150 lb, flat faced DN 50 PN 40, flat faced DN 80 PN 40, flat faced DN 100 PN 40, flat faced DN 150 PN 40, flat faced 2" ASME 300 lb, flat faced, available with Pressure rating option 1 only due to flange hole spacing 3" ASME 300 lb, flat faced 4" ASME 300 lb, flat faced 6" ASME 300 lb, flat faced JIS DN 50 10K JIS DN 80 10K JIS DN 100 10K JIS DN 150 10K (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.) Threaded connection (316L stainless steel) 1 1/2" NPT [(Taper), ANSI/ASME B1.20.1] 2" NPT [(Taper), ANSI/ASME B1.20.1] R 1 1/2" [(BSPT), EN 10226] R 2" [(BSPT), EN 10226] G 1 1/2" [(BSPP), EN ISO 228-1] G 2" [(BSPP), EN ISO 228-1]	AA BA CA DA FB GB HB JB AC BC CC DC FD GD HD JD AE BE CE DE	Approvals General Purpose, CE, R&TTE, RCM General Purpose, CSA FM, Industry Canada, FCC Intrinsically Safe, CSA Class I, II, Div. 1, Groups A, B, C, D, E, F, G, Industry Canada Intrinsically Safe, FM Class I, II, Div. 1, Groups A, B, C, D, E, F, G, FCC Intrinsically Safe, IECEx/ATEX II 1G Ex ia IIC T4, INMETRO Ex ia IIC T4, CE, R&TTE, RCM; GOST-R Non incendive, FM Class I, Div. 2, Groups A, B, C, D, FCC ²⁾ Increased Safety, ATEX II 1/2G Ex e mb ia IIC T4 Ga/Gb, CE, R&TTE, RCM; GOST-R ³⁾⁴⁾ Flame Proof, ATEX II 1/2G Ex d mb ia IIC T4 Ga/Gb, CE, R&TTE, RCM; GOST-R ⁴⁾ Explosion Proof, CSA/FM Class I, II, III, Groups A, B, C, D, E, F, G, Industry Canada, FCC ²⁾⁴⁾	A B C D E F G H J
Antenna extensions or Inactive shield length No antenna extension 50 mm (2 inch) extension, PTFE 100 mm (4 inch) extension, PTFE 100 mm (4 inch) extension, 316L stainless steel shield ¹⁾ 150 mm (6 inch) extension, 316L stainless steel shield ¹⁾ 200 mm (8 inch) extension, 316L stainless steel shield ¹⁾ 250 mm (10 inch) extension, 316L stainless steel shield ¹⁾	0 1 2 3 4 5 6	Pressure rating Rating per Pressure/Temperature curves in manual 0.5 bar g (7.25 psi g) maximum	0 1
Process seal/gasket Integral Gasket, for flat faced flange process connections only, not for Antenna extension options 3 ... 6 FKM O-ring, not available for combination of flat faced flanges with Antenna extension options 0, 1 or 2	0 1	¹⁾ Available with process connection options BA, CA, DA, GB, HB, JB, BC, CC, DC, GD, HD, JD, BE, CE, DE, MA, MC, ME only ²⁾ Available with enclosure option 2 only ³⁾ Available with enclosure option 3 only ⁴⁾ Available with communication option C only	
Enclosure/Cable inlet Aluminum, Epoxy painted			

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR200

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]; Measuring-point number/identification (max. 27 characters); specify in plain text	Y15
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Namur NE43 compliant, device preset to failsafe < 3.6 mA ³⁾	N07
Operating Instructions for HART/mA device	
English	A5E32337676
German	A5E34942758
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E31993614
Operating Instructions for PROFIBUS PA device	
English	A5E32337680
German	A5E34942820
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E32153438
Accessories	
Handheld programmer, Intrinsically safe, EEx ia	7ML1930-1BK
Antenna, rod, PTFE	7ML1830-1HC
Antenna extension, 50 mm (2 inch), PTFE	7ML1830-1CH
Antenna extension, 100 mm (4 inch), PTFE	7ML1830-1CG
HART modem / USB (for use with PC and SIMATIC PDM)	7MF4997-1DB
Metallic cable gland M20 x 1.5, rated -40 °C (-40 °F) ... 80 °C. (176 °F), HART (two are required)	7ML1930-1AP
Metallic cable gland M20 x 1.5, rated -40 °C (-40 °F) ... 80 °C. (176 °F), PROFIBUS PA (two are required)	7ML1930-1AQ
One General Purpose polymeric cable gland M20 x 1.5, rating for -20°C (-4°F) ...+ 80°C. (176 °F)	7ML1930-1AM
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch - see point level measurement section	

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LR200, Flange adapter/Horn Antenna version 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature and pressure, to a range of 20 m (66 ft). ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5425-	SITRANS LR200, Flange adapter/Horn Antenna version 2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature and pressure, to a range of 20 m (66 ft).	7ML5425-
Antenna material (uses antenna adapter) 316L stainless steel with PTFE cone emitter 316L stainless steel with PTFE cone emitter and purge connection with 1/8" NPT inlet ¹⁾ Sliding waveguide system with 1 000 mm (40 inch) waveguide ¹⁾²⁾	0 1 2	Process seal/gasket FKM (-40 ... +200 °C) Nitrile (-40 ... +60 °C), sliding waveguide systems only FFKM (-35 ... +200 °C)	0 1 2
Process connection (refer to Pressure/Temperature curves, page 4/209) Flanges (316L stainless steel) DN 50 PN 16 EN 1092-1 Type A flat faced ¹⁾ DN 80 PN 16 EN 1092-1 Type A flat faced DN 100 PN 16 EN 1092-1 Type A flat faced DN 150 PN 16 EN 1092-1 Type A flat faced DN 200 PN 16 EN 1092-1 Type A flat faced DN 80 PN 10/16 DIN EN 1092-1 Type B1 raised face ³⁾ DN 100 PN 10/16 DIN EN 1092-1 Type B1 raised face ³⁾ DN 150 PN 10/16 DIN EN 1092-1 Type B1 raised face ³⁾ DN 200 PN 16 DIN EN 1092-1 Type B1 raised face ³⁾ 2" ASME 150 lb, flat faced ¹⁾ 3" ASME 150 lb, flat faced 4" ASME 150 lb, flat faced 6" ASME 150 lb, flat faced 8" ASME 150 lb, flat faced DN 50 PN 40, flat faced ³⁾ DN 80 PN 40, flat faced ³⁾ DN 100 PN 40, flat faced ³⁾ DN 200 PN 40, flat faced ³⁾ DN 80 PN 25/40 DIN EN 1092-1 Type B1 raised face ³⁾ DN 100 PN 25/40 DIN EN 1092-1 Type B1 raised face ³⁾ DN 150 PN 25/40 DIN EN 1092-1 Type B1 raised face ³⁾ 2" ASME 300 lb, flat faced ¹⁾³⁾ 3" ASME 300 lb, flat faced ³⁾ 4" ASME 300 lb, flat faced ³⁾ JIS DN 50 10K ¹⁾ JIS DN 80 10K JIS DN 100 10K JIS DN 150 10K JIS DN 200 10K (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)	AA BA CA DA EA BF CF DF EF FB GB HB JB KB AC BC CC EC CG DG EG FD GD HD AE BE CE DE EE	Enclosure/Cable inlet Aluminum, Epoxy painted 2 x 1/2" NPT 2 x M20x1.5	2 3
Communication/Output PROFIBUS PA 4 ... 20 mA, HART, start-up at < 3.6 mA	1 2	Horn size/Waveguide options 80 mm (3 inch) horn ⁴⁾ 100 mm (4 inch) horn ⁴⁾ 150 (6 inch) mm horn 200 (8 inch) mm horn 100 mm (4 inch) horn with 100 mm (4 inch) waveguide extension ⁴⁾ 100 mm (4 inch) horn with 150 mm (6 inch) waveguide extension ⁴⁾ 100 mm (4 inch) horn with 200 mm (8 inch) waveguide extension ⁴⁾ 100 mm (4 inch) horn with 250 mm (10 inch) waveguide extension ⁴⁾ 150 mm (6 inch) horn with 100 mm (4 inch) waveguide extension 150 mm (6 inch) horn with 150 mm (6 inch) waveguide extension 150 mm (6 inch) horn with 200 mm (8 inch) waveguide extension 150 mm (6 inch) horn with 250 mm (10 inch) waveguide extension 200 mm (8 inch) horn with 100 mm (4 inch) waveguide extension 200 mm (8 inch) horn with 150 mm (6 inch) waveguide extension 200 mm (8 inch) horn with 200 mm (8 inch) waveguide extension 200 mm (8 inch) horn with 250 mm (10 inch) waveguide extension (Add Order code Y01 and plain text: "waveguide length ... mm")	B C D E F G H J K L M N P Q R S

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR200

Selection and Ordering data

Article No.

SITRANS LR200,

Flange adapter/Horn Antenna version

2-wire, 6 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in process vessels including high temperature and pressure, to a range of 20 m (66 ft).

Approvals

General Purpose, CE, R&TTE, RCM
General Purpose, CSA, FM, Industry Canada, FCC
Intrinsically Safe, CSA Class I, II, Div. 1, Groups A, B, C, D, E, F, G, Industry Canada

Intrinsically Safe, FM Class I, II, Div. 1, Groups A, B, C, D, E, F, G, FCC

Intrinsically Safe, IECEx/ATEX II 1G Ex ia IIC T4, INMETRO Ex ia IIC T4, CE, R&TTE, RCM; GOST-R Non Incendive, FM Class I, Div. 2, Groups A, B, C, D, FCC⁵⁾

Increased Safety, ATEX II 1/2G Ex e mb ia IIC T4 Ga/Gb, CE, R&TTE, RCM; GOST-R⁶⁾⁷⁾

Flame Proof, ATEX II 1/2G Ex d mb ia IIC T4 Ga/Gb, CE, R&TTE, RCM; GOST-R⁷⁾

Explosion Proof, CSA/FM Class I, II, III, Groups A, B, C, D, E, F, G, Industry Canada, FCC⁵⁾⁷⁾

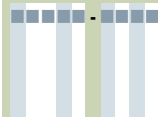
Pressure rating

Rating per Pressure/Temperature curves in manual 0.5 bar g (7.25 psi g) maximum

- 1) Available with pressure rating option 1 only
- 2) Maximum Process Temperature 60 °C (140 °F)
- 3) Available with Antenna Material option 0 and 1 only
- 4) For stillpipe applications only
- 5) Available with enclosure option 2 only
- 6) Available with enclosure option 3 only
- 7) Available with communication option 2 only

Article No.

7ML5425-



A

B

C

D

E

F

G

H

J

0

1

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification
(max. 27 characters); specify in plain text

Y15

Manufacturer's test certificate: M to DIN 55350,
Part 18 and to ISO 9000

C11

Inspection Certificate Type 3.1 per EN 10204

C12

Namur NE43 compliant, device preset to failsafe
< 3.6 mA¹⁾

N07

Operating Instructions for HART/mA device

English

Article No.

A5E32337676

German

A5E34942758

Note: The Operating Instructions should be
ordered as a separate line item on the order.

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics
manual DVD containing the ATEX Quick Start and
Operating Instructions library.

A5E31993614

Operating Instructions for PROFIBUS PA device

English

A5E32337680

German

A5E34942820

Note: The Operating Instructions should be
ordered as a separate line item on the order.

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics
manual DVD containing the ATEX Quick Start and
Operating Instructions library.

A5E32153438

Accessories

Handheld programmer, Intrinsically safe, EEx ia
HART modem/USB
(for use with a PC and SIMATIC PDM)

7ML1930-1BK

7MF4997-1DB

One metallic cable gland M20x1.5,
rated -40 ... +80 °C (-40 ... +176 °F), HART²⁾

7ML1930-1AP

One metallic cable gland M20x1.5,
rated -40 ... +80 °C (-40 ... +176 °F),
PROFIBUS PA³⁾

7ML1930-1AQ

One general purpose polymeric cable gland
M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F)

7ML1930-1AM

SITRANS RD100, loop powered display -
see Chapter 7

7ML5741-...

SITRANS RD200, universal input display with
Modbus conversion - see Chapter 7

7ML5740-...

SITRANS RD300, dual line display with totalizer
and linearization curve and Modbus conversion -
see Chapter 7

7ML5744-...

SITRANS RD500 web, universal remote monitoring
solution for instrumentation - see Chapter 7

7ML5750-...

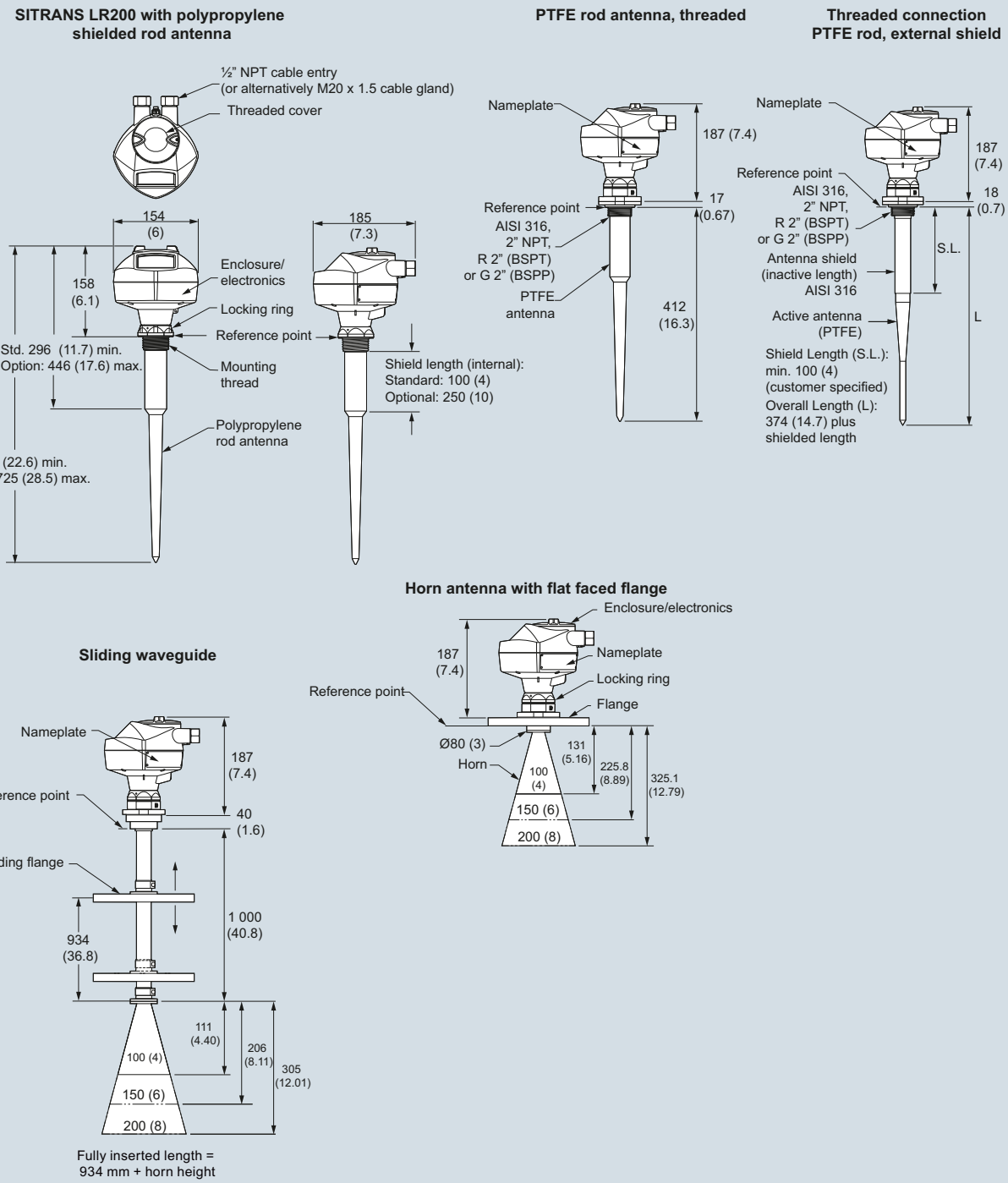
For applicable back up point level switch -
see point level measurement section

1) Available with communication option 2 only

2) Product shipped with plastic cable gland, rated to -20 °C.
If -40 °C rating required, then metallic cable gland is recommended.

3) Available with enclosure option 2 only

Dimensional drawings



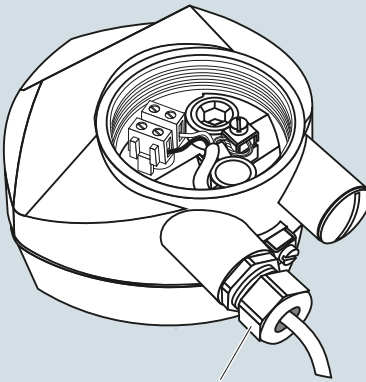
SITRANS LR200, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

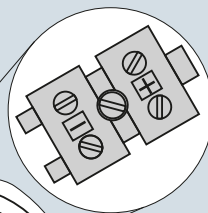
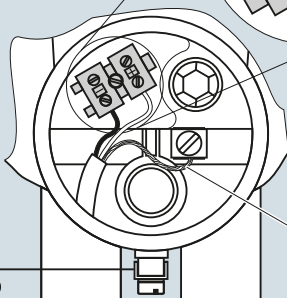
SITRANS LR200

Schematics



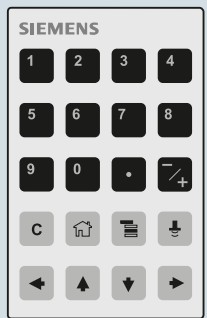
Gland

Connect the wires to the terminals as shown: the polarity is identified on the terminal block.

Shield for HART and PROFIBUS PA intrinsically safe versions only.

Hand programmer



Part number:
7ML1930-1BK

Notes:

1. DC terminal shall be supplied from an SELV source in accordance with IEC 1010-1 Annex H.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

SITRANS LR200 connections

Integration



Antenna configurations for SITRANS LR200

Technical specifications

Antenna Types	Flat Faced Flange with Rod	Shielded Rod	Horn (4", 6", 8" sizes available)
Connection type	Flat faced flange nominal pipe sizes 50, 80, 100, 150 mm (2, 3, 4, 6 inch)	Threaded 2" NPT, R 2" (BSPT), G 2" (BSPP) or flat faced flange nominal pipe sizes 80, 100 mm (3, 4 inch)	Flat faced flange nominal pipe sizes 50, 80, 100, 150 mm (2, 3, 4, 6 inch)
Wetted parts	PTFE	PTFE, 316L stainless steel, FKM o-ring	316L stainless steel PTFE, FKM o-ring
Extensions	50 or 100 mm (2 or 4 inch) PTFE or UHMW-PE	100, 150, 200 or 250 mm (4, 6, 8 or 10 inch) standard shield length	Use waveguide for extensions to 6 m (20 ft) long
Dielectric constant	> 3	> 3	> 3
Insertion length (max.)	41 cm (16.3 inch)	Variable	Variable with extension
Purging option (liquid or gas)	No	No	Yes
Sliding waveguide option for digesters¹⁾	Yes	No	Yes
Weight²⁾	6.5 kg (14.3 lb)	5.0 kg (11 lb)	7.5 kg (16.5 lb)

¹⁾ Maximum pressure 0.5 bar g at 60 °C (7.25 psi g at 140 °F)

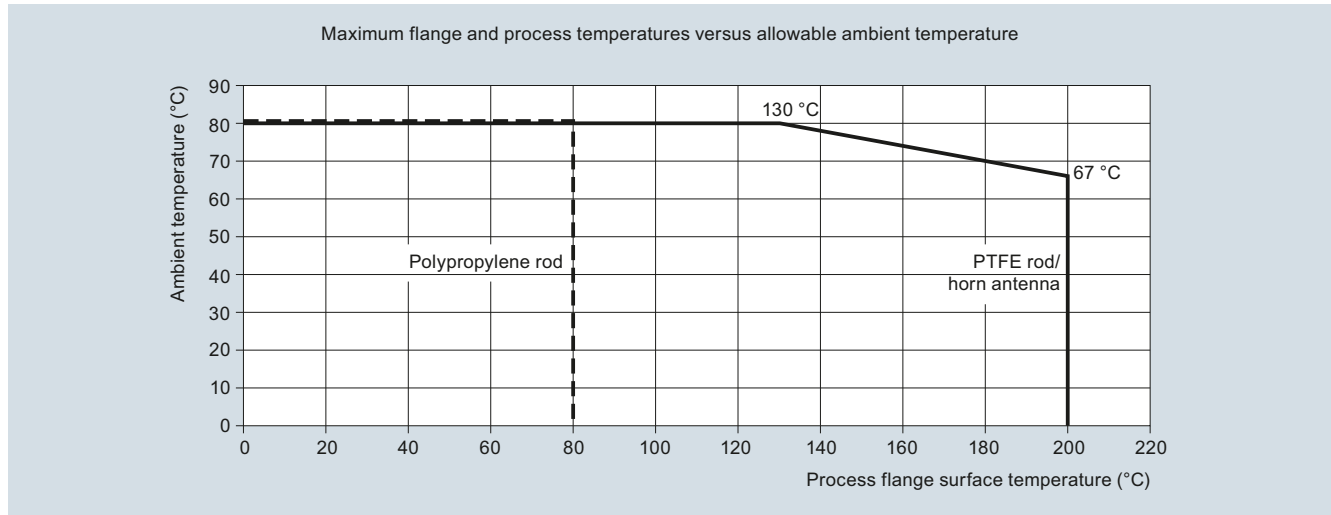
²⁾ Not including extensions, includes SITRANS LR200 and smallest process connection

Level Measurement

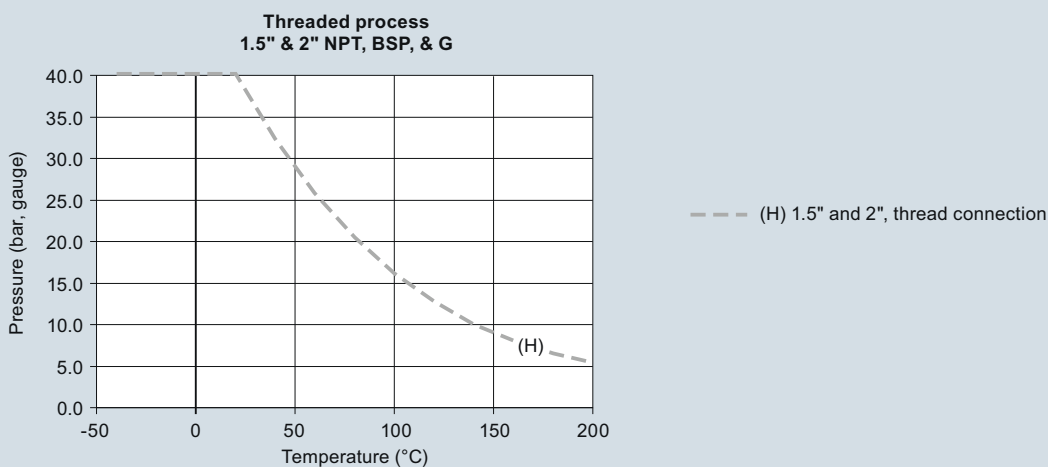
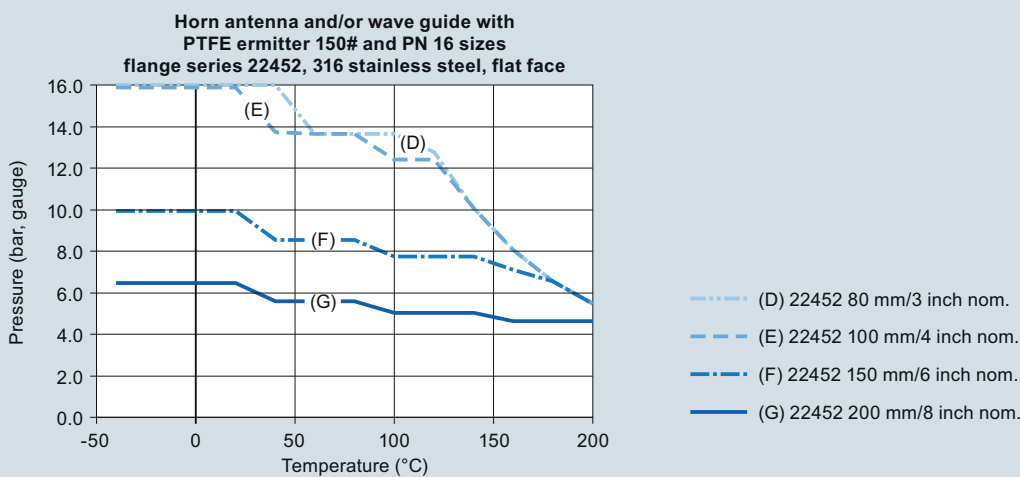
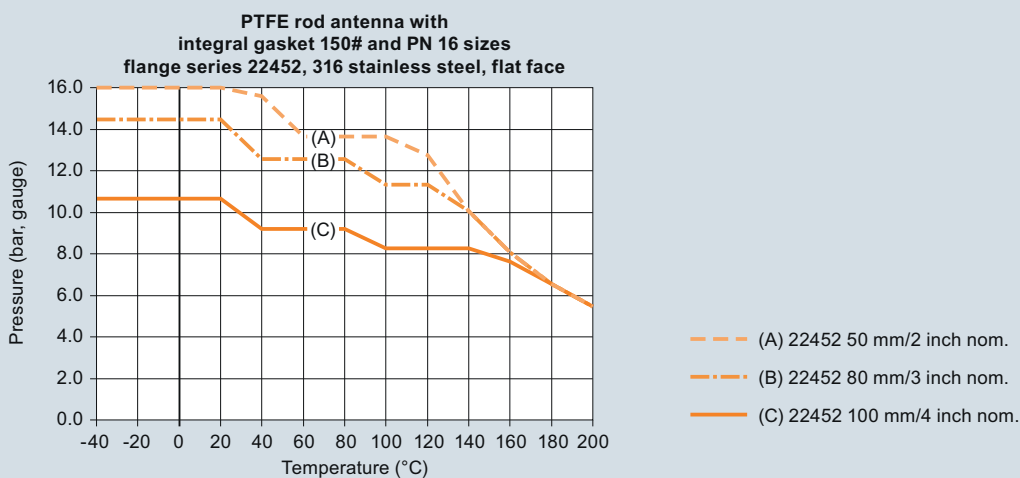
Continuous level measurement – Radar transmitters

SITRANS LR200 Antennas

Characteristic curves



SITRANS LR200 Ambient/Process Flange Surface Temperature Curve



SITRANS LR200 Process Pressure/Temperature derating curves



Level Measurement

Continuous level measurement – Radar transmitters


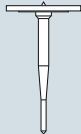
SITRANS LR200 Specials

Selection and ordering data

SITRANS LR200 Specials

	Article No.
SITRANS LR200 PROFIBUS PA Aluminum Enclosure Kit with electronics and covers (7ML5422, 7ML5423, 7ML5424, 7ML5425), calibrated for use with standard rod antenna 	
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection. ⁵⁾	A5E01483420
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection. ⁵⁾	A5E01483440
SITRANS LR200 aluminum enclosure with board stack, LUI display, 6.3 GHz, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection. ⁵⁾	A5E01483456
SITRANS LR200 aluminum enclosure with board stack, LUI display, 6.3 GHz, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection. ⁵⁾	A5E01483547
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, NPT cable inlet, approval option E, with PROFIBUS PA communication, no process connection. ⁵⁾	A5E01483559
SITRANS LR200 HART aluminum enclosure kit with electronics and covers (7ML5422, 7ML5423, 7ML5424, 7ML5425), calibrated for use with standard rod antenna 	
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, M20 cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E02956419
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, M20 cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E02956420
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, M20 cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E02956421
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, M20 cable inlet, approval option H, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E02956422

SITRANS LR200 Specials

	Article No.
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, NPT cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E03617085
SITRANS LR200 aluminum enclosure with board stack, LUI display, 6.3 GHz, NPT cable inlet, approval option B, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E03617086
SITRANS LR200 aluminum enclosure with board stack, LUI display, 5.8 GHz, NPT cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E03617087
SITRANS LR200 aluminum enclosure with board stack, LUI display, 6.3 GHz, NPT cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection. ⁵⁾	A5E03617088
SITRANS LR200 Horn Antenna Kits with mounting screws (no emitter supplied) 	
80 mm (3 inch) horn antenna kit	PBD:25500K02A
100 mm (4 inch) horn antenna kit	PBD:25500K03A
150 mm (6 inch) horn antenna kit	PBD:25500K05A
200 mm (8 inch) horn antenna kit	PBD:25500K07A
SITRANS LR200 Extension Kits for Horn Antenna with mounting screws	
100 mm (4 inch) extension kit for horn antenna	PBD:25501K0100A
150 mm (6 inch) extension kit for horn antenna	PBD:25501K0150A
200 mm (8 inch) extension kit for horn antenna	PBD:25501K0200A
250 mm (10 inch) extension kit for horn antenna	PBD:25501K0250A
500 mm (20 inch) extension kit for horn antenna	PBD:25501K0500A
1 000 mm (40 inch) extension kit for horn antenna	PBD:25501K1000A
SITRANS LR200 Flanged Rod Antenna Kit with 316L stainless steel flat faced flanges 	
Flanged PTFE rod antenna kit, 2" ASME, 150 lb. See drawing 51003 on http://www.siemens.com/radar ¹⁴⁾	PBD:51003K020AAAA
Flanged PTFE rod antenna kit, DN 50 PN 16. See drawing 51003 on http://www.siemens.com/radar ¹⁴⁾	PBD:51003K050AJAA
Flanged PTFE rod antenna kit, JIS 10K DN 50. See drawing 51003 on http://www.siemens.com/radar ¹⁴⁾	PBD:51003K050AOAA

SITRANS LR200 Specials

Article No.

SITRANS LR200 PTFE Rod Antenna Kit with 316L stainless steel 1½" pipe thread process connection

PTFE rod antenna kit, 1½" NPT 316L stainless steel process connection, FKM O-ring; See drawing 51004 on <http://www.siemens.com/radar>⁴⁾

PBD:
51004K1AAA

PTFE rod antenna kit, R 1½" (BSPT), EN 10226 316L stainless steel process connection, FKM O-ring; see drawing 51004 on <http://www.siemens.com/radar>⁴⁾

PBD:
51004K2AAA

PTFE rod antenna kit, 1½" G 316L stainless steel process connection, FKM O-ring; see drawing 51004 on <http://www.siemens.com/radar>⁴⁾

PBD:
51004K3AAA

SITRANS LR200 PTFE Rod Antenna Kit with 316L stainless steel 2" pipe thread process connection

PTFE rod antenna kit, 2" NPT 316L stainless steel process connection, FKM O-ring; see drawing 51005 on <http://www.siemens.com/radar>⁴⁾

PBD:
51005K1AAA

PTFE rod antenna kit, R 2" (BSPT), EN 10226 316L stainless steel process connection, FKM O-ring; see drawing 51005 on <http://www.siemens.com/radar>⁴⁾

PBD:
51005K2AAA

PTFE rod antenna kit, 2" G 316L stainless steel process connection, FKM O-ring; see drawing 51005 on <http://www.siemens.com/radar>⁴⁾

PBD:
51005K3AAA

SITRANS LR200 Specials

Article No.

SITRANS LR200 PTFE Rod Antenna Kit (100 mm shield) with 316L stainless steel 2" pipe thread process connection

PTFE rod antenna shielded kit, 2" NPT 316L stainless steel process connection, FKM O-ring, 100 mm 316L stainless steel shield. See drawing 51002 on <http://www.siemens.com/radar>³⁾⁴⁾

PBD:
51002K0100AAA

PTFE rod antenna shielded kit, R 2" (BSPT), EN 10226 316L stainless steel process connection, FKM O-ring, 100 mm 316L stainless steel shield. See drawing 51002 on <http://www.siemens.com/radar>³⁾⁴⁾

PBD:
51002K0100BAA

PTFE rod antenna shielded kit, 2" G 316L stainless steel process connection, FKM O-ring, 100 mm 316L stainless steel shield. See drawing 51002 on <http://www.siemens.com/radar>³⁾⁴⁾

PBD:
51002K0100CAA

SITRANS LR200 Horn Antenna Kit with 316L stainless steel flat faced flange, with PTFE emitter (without waveguide)

Horn antenna kit, 2" ASME 316L stainless steel flange 3" horn, PTFE emitter¹⁾⁴⁾

PBD:
51006K020AAAA

Horn antenna kit, 2" ASME 316L stainless steel flange 4" horn, PTFE emitter¹⁾²⁾

PBD:
51006K020AABA

Horn antenna kit, 2" ASME 316L stainless steel flange 6" horn, PTFE emitter¹⁾²⁾

PBD:
51006K020AACA

Horn antenna kit, 2" ASME 316L stainless steel flange 8" horn, PTFE emitter¹⁾²⁾

PBD:
51006K020AADA

Horn antenna kit, DN 50 PN 16 316L stainless steel flange 80 mm horn, PTFE emitter¹⁾²⁾

PBD:
51006K050AJAA

Horn antenna kit, DN 50 PN 16 316L stainless steel flange 100 mm horn, PTFE emitter¹⁾²⁾

PBD:
51006K050AJBA

Horn antenna kit, DN 50 PN 16 316L stainless steel flange 150 mm horn, PTFE emitter¹⁾²⁾

PBD:
51006K050AJCA

Horn antenna kit, DN 50 PN 16 316L stainless steel flange 200 mm horn, PTFE emitter¹⁾²⁾

PBD:
51006K050AJDA

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR200 Specials

SITRANS LR200 Specials

Article No.

SITRANS LR200 PTFE flanged rod antenna kit with 316L stainless steel shield and 316L stainless steel flat faced flange



PTFE shielded rod antenna kit, flanged, 3" ASME 150 lb 316L stainless steel flange, 100 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0100AAA

PTFE shielded rod antenna kit, flanged, DN 80 PN 16 316L stainless steel flange, 100 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0100EJA

PTFE shielded rod antenna kit, flanged, 3" ASME 150 lb 316L stainless steel flange, 150 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0150AAA

PTFE shielded rod antenna kit, flanged, DN 80 PN 16 316L stainless steel flange, 150 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0150EJA

PTFE shielded rod antenna kit, flanged, 3" ASME 150 lb 316L stainless steel flange, 200 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0200AAA

PTFE shielded rod antenna kit, flanged, DN 80 PN 16 316L stainless steel flange, 200 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0200EJA

PTFE shielded rod antenna kit, flanged, 3" ASME 150 lb 316L stainless steel flange, 250 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0250AAA

PTFE shielded rod antenna kit, flanged, DN 80 PN 16 316L stainless steel flange, 250 mm 316L stainless steel shield.¹⁾⁴⁾

PBD:
51014K0250EJA

SITRANS LR200 Specials

Article No.

PTFE paste

Kit, PTFE paste, Tube, 250 mL

PBD:51036065

Cable gland

One polymeric cable gland M20x1.5, rated -20 ... +80 °C (-4 ... +176 °F) for General Purpose and ATEX EEx e

7ML1930-1AN

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART

7ML1930-1AP

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA

7ML1930-1AQ

Please contact ceg.smpi@siemens.com for special requests.

- 1) Available in flange sizes including ASME, DIN and JIS: please contact ceg.smpi@siemens.com.
- 2) Available with no pressure rating
- 3) Available in other shield lengths: please contact ceg.smpi@siemens.com.
- 4) Available with Pressure rating; serial number of original unit required with completed Application Questionnaire found on page 4/193.

4

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

Overview



SITRANS LR250 is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft).

Benefits

- Graphical local user interface (LUI) makes operation simple with plug-and-play setup using the intuitive Quick Start Wizard
- LUI displays echo profiles for diagnostic support
- 25 GHz high frequency allows for small antennas for easy mounting in nozzles
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Short blanking distance for improved minimum measuring range to 50 mm (2 inch) from the end of the antenna
- Communication using HART, PROFIBUS PA, or FOUNDATION Fieldbus
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or over a network using SIMATIC PDM, Emerson AMS, or Field Device Tools, such as PAC Tware or Fieldcare via SITRANS DTM
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511
- 3 mm (0.118 inch) accuracy in accordance with IEC 60770-1

Application

SITRANS LR250 includes a graphical local user interface (LUI) that improves setup and operation by including an intuitive Quick Start Wizard, and echo profile displays for diagnostic support. Start-up is easy using the Quick Start wizard with a few parameters required for basic operation.

The 25 GHz frequency creates a narrow, focused beam allowing for smaller horn antenna options and decreasing sensitivity to obstructions.

SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without saving to open the instrument's lid.

SITRANS LR250 measures superbly on low dielectric media, and in small vessels, as well as tall and narrow vessels.

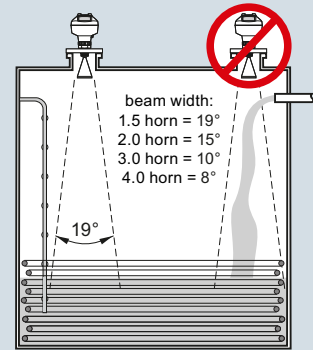
- Key Applications: liquid bulk storage tanks, process vessels, vaporous liquids, high temperatures, low dielectric media and applications with functional safety requirements

Configuration

Installation

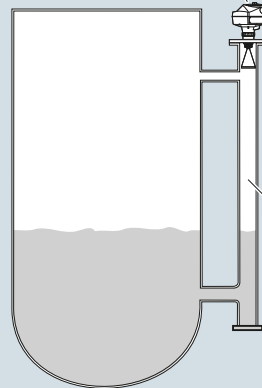
Note:

- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the horn antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.
- Use largest possible antenna.



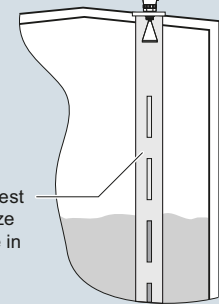
Mounting unit on bypass

Orient front or back of device toward vent.

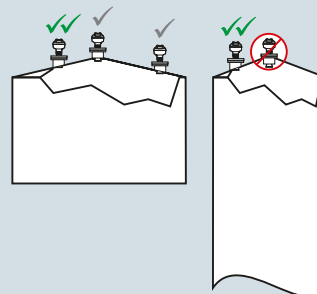


Mounting unit on stilling well

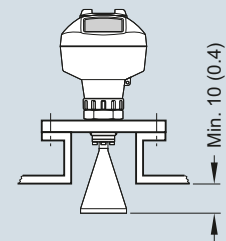
Orient front or back of device toward stillpipe slots.



Mounting unit on vessel



Mounting on a nozzle



SITRANS LR250 installation, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

Technical specifications

Mode of operation		Process connections	
Measuring principle	Radar level measurement	• Process connection	1½", 2" or 3" NPT [(Taper), ANSI/ASME B1.20.1] R 1½", 2" or 3" [(BSPT), EN 10226] G 1½", 2" or 3" [(BSPP), EN ISO 228-1]
Frequency	K-band (25.0 GHz)	• Flange connection	2", 3", 4" (ANSI 150, 300 lb), 50, 80, 100 mm (PN 16, 40, JIS 10K)
Minimum measuring range	50 mm (2 inch) from end of antenna	Power supply	
Maximum measuring range	20 m (65 ft), antenna dependent	4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
Output		PROFIBUS PA	• 15 mA • Per IEC 61158-2
HART:	Version 5.1	FOUNDATION Fieldbus	• 20.0 mA • Per IEC 61158-2
• Analog output	4 ... 20 mA	Certificates and approvals	
• Accuracy	± 0.02 mA	General	
• Fail-safe	• Programmable as high low or hold (loss of echo) • NE 43 programmable	CSA _{US/C} , CE, FM, NE 21, RCM	
PROFIBUS PA:	Profile 3.01	Radio	
• Function blocks	2 Analog Input (AI)	FCC, Industry Canada and Europe ETSI EN 302-372, RCM	
FOUNDATION Fieldbus	H1	Hazardous	
• Functionality	Basic or LAS	• Explosion Proof (Brazil)	
• Version	ITK 5.2.0	• Increased Safety (Brazil)	
• Function blocks	2 Analog Input (AI)	• Intrinsic Safety (Brazil)	
Performance (according to reference conditions IEC60770-1)		• Explosion Proof (Canada/USA)	
Maximum measured error	3 mm (0.118 inch)	• Intrinsic Safety (Canada/USA)	
Influence of ambient temperature	< 0.003 %/K	• Non-incendive (Canada/USA)	
Rated operating conditions		• Flame Proof/Increased Safety (China)	
Installation conditions		• Intrinsic Safety (China)	
• Location	Indoor/outdoor	• Non-sparking (China)	
Ambient conditions (enclosure)		• Intrinsic Safety (Europe)	
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)	• Non-sparking (Europe)	
• Installation category	I	• Flame Proof (International/Europe)	
• Pollution degree	4	• Increased Safety (International/Europe)	
Medium conditions		• Intrinsic Safety (International)	
Dielectric constant ϵ_r	> 1.6, antenna and application dependent	• Explosion Proof (Russia)	
Process temperature	-40 ... +200 °C (-40 ... +392 °F) (at process connection with FKM O-ring) -20 ... +200 °C (-4 ... +392 °F) (at process connection with FFKM O-ring)	• Increased Safety (Russia)	
Process pressure	Up to 40 bar g (580 psi g), process connection and temperature dependent. See Pressure/Temperature curves for more information	• Intrinsic Safety (Russia)	
Design		• Marine	
Enclosure		• Functional Safety	
• Material	Aluminum, polyester powder-coated	GOST-R Ex d	
• Cable inlet	2 x M20x1.5 or 2 x ½" NPT	GOST-R Ex e	
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68	GOST-R Ex ia	
Weight	< 3 kg (6.6 lb) 3.75 mm (1½ inch) threaded connection with 1½" horn antenna	• Lloyd's Register of Shipping	
Display (local)	Graphic local user interface including quick start wizard and echo profile display	• ABS Type Approval	
Antenna		• Bureau Veritas	
• Material	316L stainless steel [optional alloy N06022/2.4602 (Hastelloy C-22 or equivalent)]	SIL-2 suitable in accordance with IEC 61508/61511	
• Dimensions (nominal horn sizes)	Standard 1.5 inch (40 mm), 2 inch (48 mm), 3 inch (75 mm), 4 inch (95 mm) horn and optional 100 mm (4 inch) horn extension		

Programming

<ul style="list-style-type: none"> • Intrinsically Safe Siemens handheld programmer <ul style="list-style-type: none"> - Approvals for handheld programmer 	Infrared receiver IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135 °C T _a = -20 ... +50 °C CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, T6 T _a = +50 °C IECEx SIR 09.0073
<ul style="list-style-type: none"> • Handheld communicator • PC 	HART communicator 375/475 <ul style="list-style-type: none"> • SIMATIC PDM • Emerson AMS • SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare)
<ul style="list-style-type: none"> • Display (local) 	Graphic local user interface including quick start wizard and echo profile displays

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

Selection and Ordering data

Article No.

SITRANS LR250 horn antenna

7ML5431-

2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft) (antenna dependent). Ideal for small vessels and low dielectric media.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Process Connection and Antenna Material

316L (1.4435 or 1.4404) stainless steel, PTFE emitter, FKM seal¹⁾ **0**
 316L (1.4435 or 1.4404) stainless steel, PTFE emitter, FFKM seal¹⁾ **1**
 Hastelloy C-22/2.4602 (or equivalent), PTFE emitter, FKM seal²⁾ **2**
 Hastelloy C-22/2.4602 (or equivalent), PTFE emitter, FFKM seal²⁾ **3**

Process Connection Type

Threaded connection 316L

1½" NPT (ASME B1.20.1) (tapered thread)³⁾ **AA**
 R 1½" [(BSPT), EN 10226-1] (tapered thread)³⁾ **AB**
 G 1½" [(BSPP), EN ISO 228-1] (parallel thread)³⁾ **AC**

2" NPT (ASME B1.20.1) (tapered thread) **AD**
 R 2" [(BSPT), EN 10226-1] (tapered thread) **AE**
 G 2" [(BSPP), EN ISO 228-1] (parallel thread) **AF**

3" NPT (ASME B1.20.1) (tapered thread) **AG**
 R 3" [(BSPT), EN 10226-1] (tapered thread) **AH**
 G 3" [(BSPP), EN ISO 228-1] (parallel thread) **AJ**

Flanged connection 316L

2" Class 150 ASME B16.5 flat faced⁴⁾ **BA**
 3" Class 150 ASME B16.5 flat faced⁴⁾ **BB**
 4" Class 150 ASME B16.5 flat faced⁴⁾ **BC**
 2" Class 300 ASME B16.5 flat faced⁴⁾ **CA**
 3" Class 300 ASME B16.5 flat faced⁴⁾ **CB**
 4" Class 300 ASME B16.5 flat faced⁴⁾ **CC**

DN 50 PN 16 EN 1092-1 Type A flat faced⁴⁾ **DA**
 DN 80 PN 16 EN 1092-1 Type A flat faced⁴⁾ **DB**
 DN 100 PN 16 EN 1092-1 Type A flat faced⁴⁾ **DC**

DN 50 PN 40 EN 1092-1 Type A flat faced⁴⁾ **EA**
 DN 80 PN 40 EN 1092-1 Type A flat faced⁴⁾ **EB**
 DN 100 PN 40 EN 1092-1 Type A flat faced⁴⁾ **EC**

50A 10K JIS B 2220 flat faced⁴⁾ **FA**
 80A 10K JIS B 2220 flat faced⁴⁾ **FB**
 100A 10K JIS B 2220 flat faced⁴⁾ **FC**

DN 50 PN 16 DIN EN 1092-1 Type B1 raised face **GA**
 DN 80 PN 16 DIN EN 1092-1 Type B1 raised face **GB**
 DN 100 PN 16 DIN EN 1092-1 Type B1 raised face **GC**

DN 150 PN 16 DIN EN 1092-1 Type B1 raised face **GD**
 DN 50 PN 40 DIN EN 1092-1 Type B1 raised face **HA**
 DN 80 PN 40 DIN EN 1092-1 Type B1 raised face **HB**

DN 100 PN 40 DIN EN 1092-1 Type B1 raised face **HC**
 DN 150 PN 40 DIN EN 1092-1 Type B1 raised face **HD**

Selection and Ordering data

Article No.

SITRANS LR250 horn antenna

7ML5431-

2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft) (antenna dependent). Ideal for small vessels and low dielectric media.

Flanged connection Hastelloy C

2" Class 150 ASME B16.5 raised faced⁴⁾ **JA**
 3" Class 150 ASME B16.5 raised faced⁴⁾ **JB**
 4" Class 150 ASME B16.5 raised faced⁴⁾ **JC**
 2" Class 300 ASME B16.5 raised faced⁴⁾ **JD**
 3" Class 300 ASME B16.5 raised faced⁴⁾ **JE**
 4" Class 300 ASME B16.5 raised faced⁴⁾ **JF**

DN 50 PN 16 EN 1092-1 Type B1 raised faced⁴⁾ **KA**
 DN 80 PN 16 EN 1092-1 Type B1 raised faced⁴⁾ **KB**
 DN 100 PN 16 EN 1092-1 Type B1 raised faced⁴⁾ **KC**

DN 50 PN 40 EN 1092-1 Type B1 raised faced⁴⁾ **KD**
 DN 80 PN 40 EN 1092-1 Type B1 raised faced⁴⁾ **KE**
 DN 100 PN 40 EN 1092-1 Type B1 raised faced⁴⁾ **KF**

50A 10K JIS B 2220 raised faced⁴⁾ **LA**
 80A 10K JIS B 2220 raised faced⁴⁾ **LB**
 100A 10K JIS B 2220 raised faced⁴⁾ **LC**

DN 50 PN 16 EN 1092-1 Type B1 raised face **MA**
 DN 80 PN 16 EN 1092-1 Type B1 raised face **MB**
 DN 100 PN 16 EN 1092-1 Type B1 raised face **MC**

DN 150 PN 16 EN 1092-1 Type B1 raised face **MD**
 DN 50 PN 40 EN 1092-1 Type B1 raised face **ME**
 DN 80 PN 40 EN 1092-1 Type B1 raised face **MF**

DN 100 PN 40 EN 1092-1 Type B1 raised face **MG**
 DN 150 PN 40 EN 1092-1 Type B1 raised face **MH**

Communication/Output

PROFIBUS PA **1**
 4 ... 20 mA, HART, start-up at < 3.6 mA **2**
 FOUNDATION Fieldbus **3**

Enclosure/Cable inlet

Aluminum, Epoxy painted **0**
 2 x ½" NPT **1**
 2 x M20x1.5 **1**

Antenna

1½" horn **A**
 2" horn (fits 2" ASME or DN 50 nozzles) **B**
 3" horn (fits 3" ASME or DN 80 nozzles) **C**
 4" horn (fits 4" ASME or DN 100 nozzles) **D**
 1½" horn with 100 mm extension **E**
 2" horn with 100 mm extension **F**
 3" horn with 100 mm extension **G**
 4" horn with 100 mm extension **H**
 Hastelloy C22 (or equivalent) **J**
 2" horn (fits 2" ASME or DN 50 nozzles) **K**
 3" horn (fits 3" ASME or DN 80 nozzles) **L**
 4" horn (fits 4" ASME or DN 100 nozzles) **M**
 2" horn (fits 2" ASME or DN 50 nozzles) with 100 mm extension **N**
 3" horn (fits 3" ASME or DN 80 nozzles) with 100 mm extension **N**
 4" horn (fits 4" ASME or DN 100 nozzles) with 100 mm extension **P**

4

Selection and Ordering data	Article No.
SITRANS LR250 horn antenna	7ML5431-
2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft) (antenna dependent). Ideal for small vessels and low dielectric media.	0 -
Approvals	
General Purpose, CE, CSA, FM, FCC, R&TTE, RCM	A
Intrinsically Safe: CSA/FM Class I, Div. 1, Groups A, B, C, D, Class II, Div.1, Groups E,F, G, Class III T4 FCC, Industry Canada	B
Intrinsically Safe: IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM	C
Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada	D
Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, R&TTE, RCM	E
Increased Safety: IECEx/ATEX II 1/2 GD,1D, 2D Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ⁵⁾	F
Flameproof: IECEx/ATEX II 1/2 GD 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ⁵⁾	G
Explosion proof: CSA/FM Class I, II and III, Div.1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ⁵⁾	H
Non Sparking: NEPSI Ex nA IIC T4 Gc	K
Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C	L
Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ⁵⁾	M
Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ⁵⁾	N
Pressure rating	
Rating per Pressure/Temperature curves in manual	0
0.5 bar g (7.25 psi g) maximum	1

- 1) Available with process connection options AA ... HD & Antenna Versions A ... H only
 - 2) Available with process connection options JA ... MH & Antenna Versions J ... P only
 - 3) Available For antenna versions A and E only, max. range 10 m (32.8 ft), dk > 3. Can measure dk > 1.6 [20 m (65.6 ft)] when mounted in a stillpipe/ bypass.
 - 4) Siemens Milltronics type flange (flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard), see operating instructions for details
 - 5) Applicable with communication option 2 only
- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

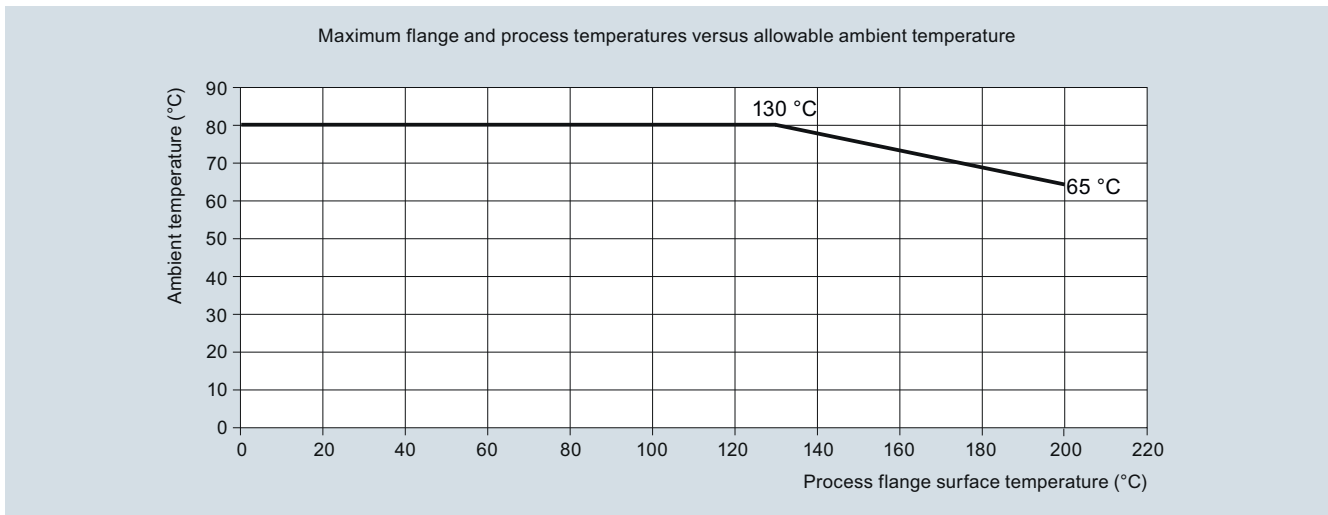
Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs		Operating Instructions for FOUNDATION Fieldbus device	
Please add "-Z" to Article No. and specify Order code(s).		English	A5E32221411
Plug M12 with mating Connector ¹⁾²⁾³⁾	◆ A50	German	A5E32376112
Plug 7/8" with mating Connector ²⁾³⁾⁴⁾	◆ A55	Note: The Operating Instructions should be ordered as a separate line item on the order.	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	◆ Y15	Compact Operating Instructions for FOUNDATION Fieldbus device	
Manufacturer's Test Certificate: M to DIN 55350, Part 18 and to ISO 9000	◆ C11	English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	A5E33472700
Inspection certificate 3.1 of EN 10204	◆ C12	English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	A5E33472738
Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ³⁾⁵⁾	◆ C20	This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.	
Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁵⁾	◆ N07	Accessories	
Operating Instructions for HART/mA device	Article No.	Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM)	7ML1930-1BK 7MF4997-1DB
English	A5E32220602	One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART (two are required)	7ML1930-1AP
German	A5E32376088	One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus (two are required) ⁶⁾	7ML1930-1AQ
Note: The Operating Instructions should be ordered as a separate line item on the order.		FDA approved FKM o-ring for 2" G (BSPP) process connections -28 ... +80 °C (-28 ... +176 °F)	7ML1830-3AN
Compact Operating Instructions for HART/mA device		SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	A5E33469191	SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	A5E33469171	SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.		SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
Operating Instructions for PROFIBUS PA device		For applicable back up point level switch - see point level measurement section	
English	A5E32221386		
German	A5E32376094		
Note: The Operating Instructions should be ordered as a separate line item on the order.			
Compact Operating Instructions for PROFIBUS PA device			
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	A5E33469239		
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	A5E33472685		
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.			
		1) Available with enclosure option 1 only	
		2) To be used with communication options 1 and 3 only. Connector has IP67 rating.	
		3) Available with approval options A and B. Available with approval option C for use on intrinsically safe applications only. Not rated for dust Ex.	
		4) Available with enclosure option 0 only	
		5) Applicable to communication option 2 only	
		6) For use with communication option 1 and 3 only	
		◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.	

Characteristic curves



SITRANS LR250 Ambient/Process Flange Surface Temperature Curve

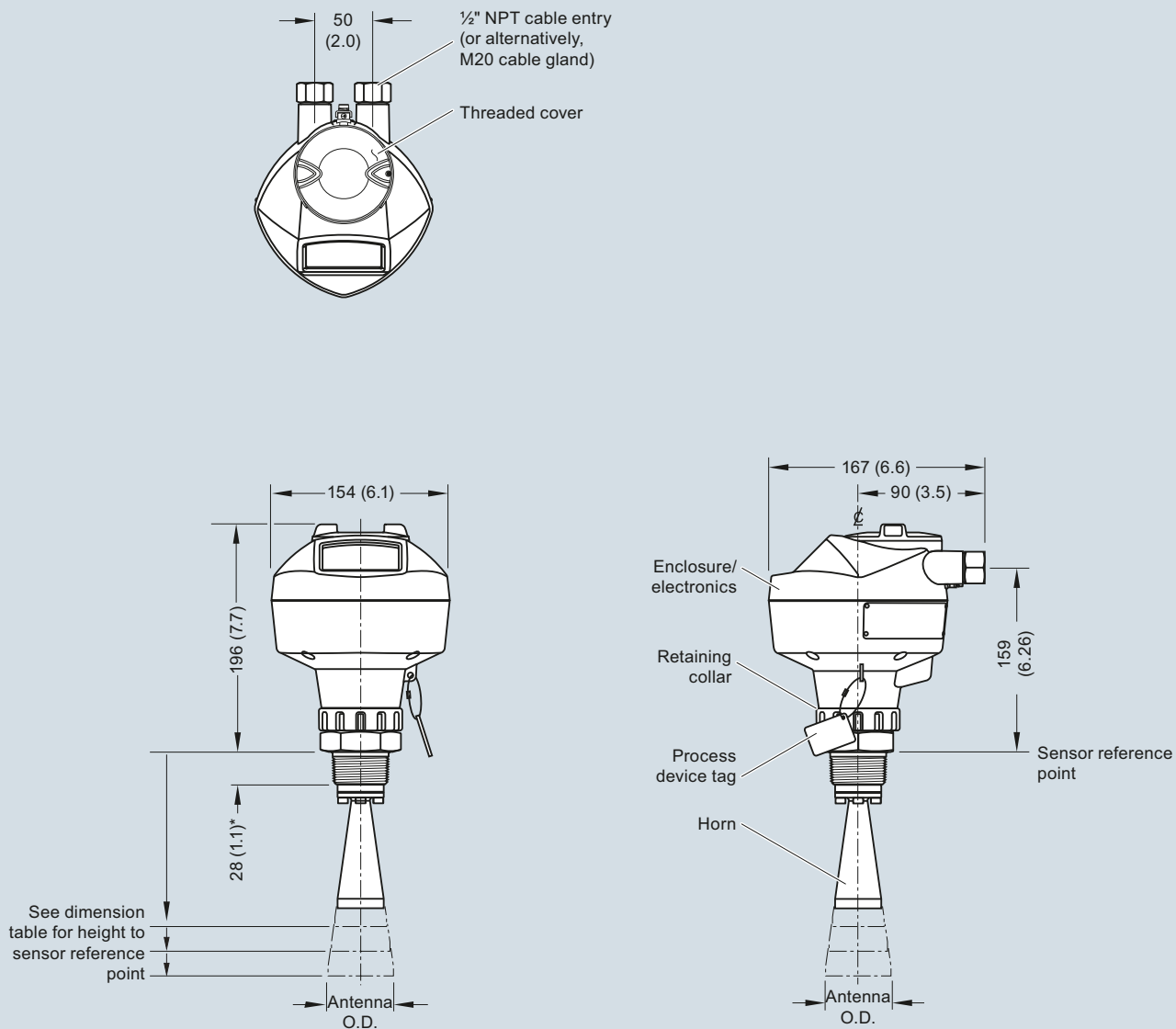
Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

Dimensional drawings

Threaded Horn Antenna

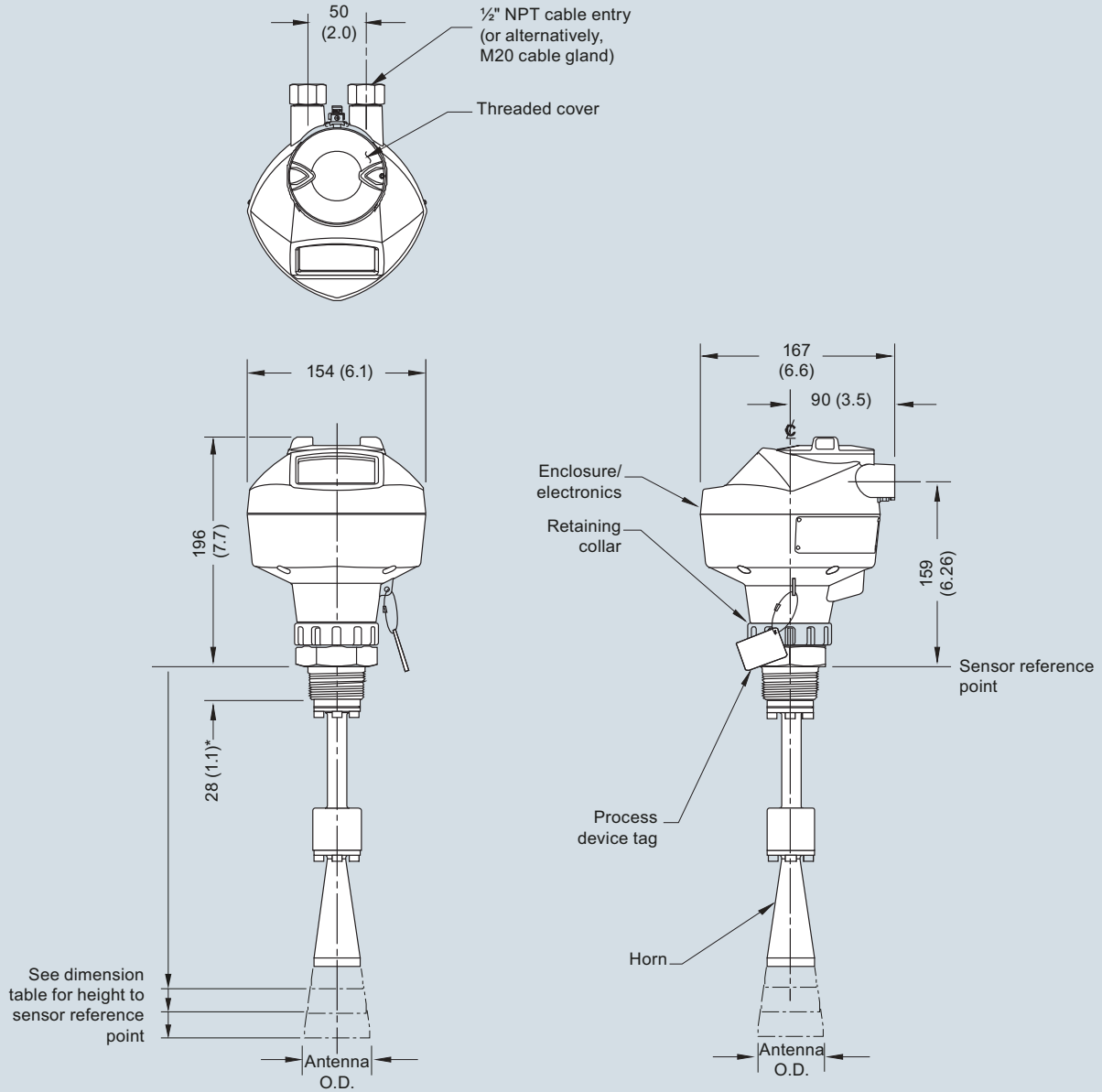


*28 mm (1.1) for 1.5 inch and 2 inch, 42 mm (1.65) for 3 inch

Antenna Type	Antenna O.D.	Height to sensor reference point			Beam angle	Measurement range
		1-1/2" threaded connection	2" threaded connection	3" threaded connection		
1.5" horn	39.8 (1.57)	135 (5.3)	N/A	N/A	19 degrees	10 m (32.8 ft)
2" horn	47.8 (1.88)	N/A	166 (6.55)	180 (7.09)	15 degrees	20 m (65.6 ft)
3" horn	74.8 (2.94)	N/A	199 (7.85)	213 (8.39)	10 degrees	20 m (65.6 ft)
4" horn	94.8 (3.73)	N/A	254 (10)	268 (10.55)	8 degrees	20 m (65.6 ft)

SITRANS LR250 Threaded Horn Antenna, dimensions in mm (inch)

Threaded Horn Antenna with Extension



*28 mm (1.1) for 1.5 inch and 2 inch, 42 mm (1.65) for 3 inch

Antenna Type	Antenna O.D.	Height to sensor reference point			Beam angle	Measurement range
		1-1/2" threaded connection	2" threaded connection	3" threaded connection		
1.5" horn	139.8 (5.57)	235 (9.3)	N/A	N/A	19 degrees	10 m (32.8 ft)
2" horn	147.8 (5.88)	N/A	266 (10.55)	280 (11.09)	15 degrees	20 m (65.6 ft)
3" horn	174.8 (6.94)	N/A	299 (11.85)	313 (12.39)	10 degrees	20 m (65.6 ft)
4" horn	194.8 (7.73)	N/A	354 (14)	368 (14.55)	8 degrees	20 m (65.6 ft)

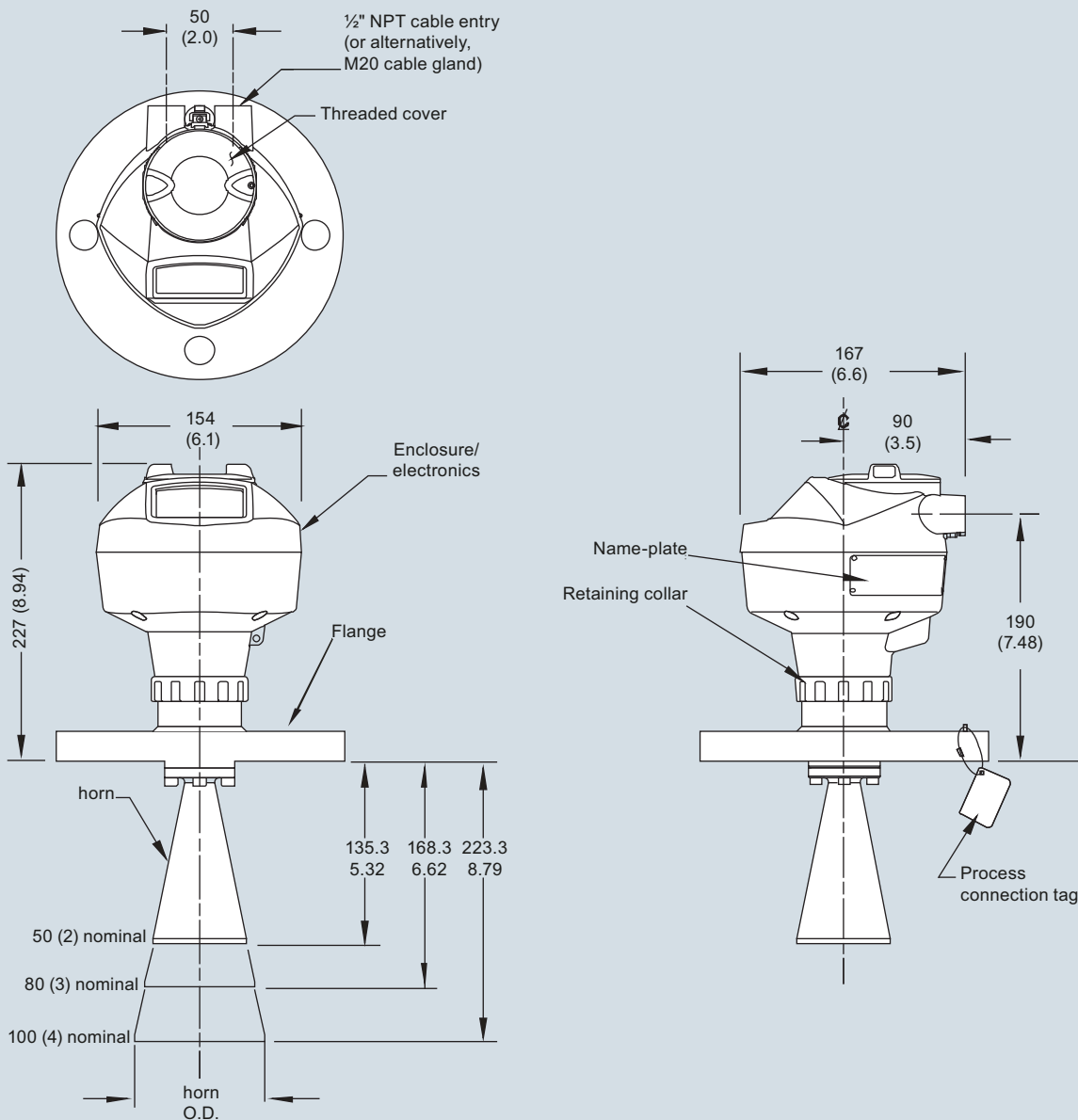
SITRANS LR250 Threaded Horn Antenna with Extension, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

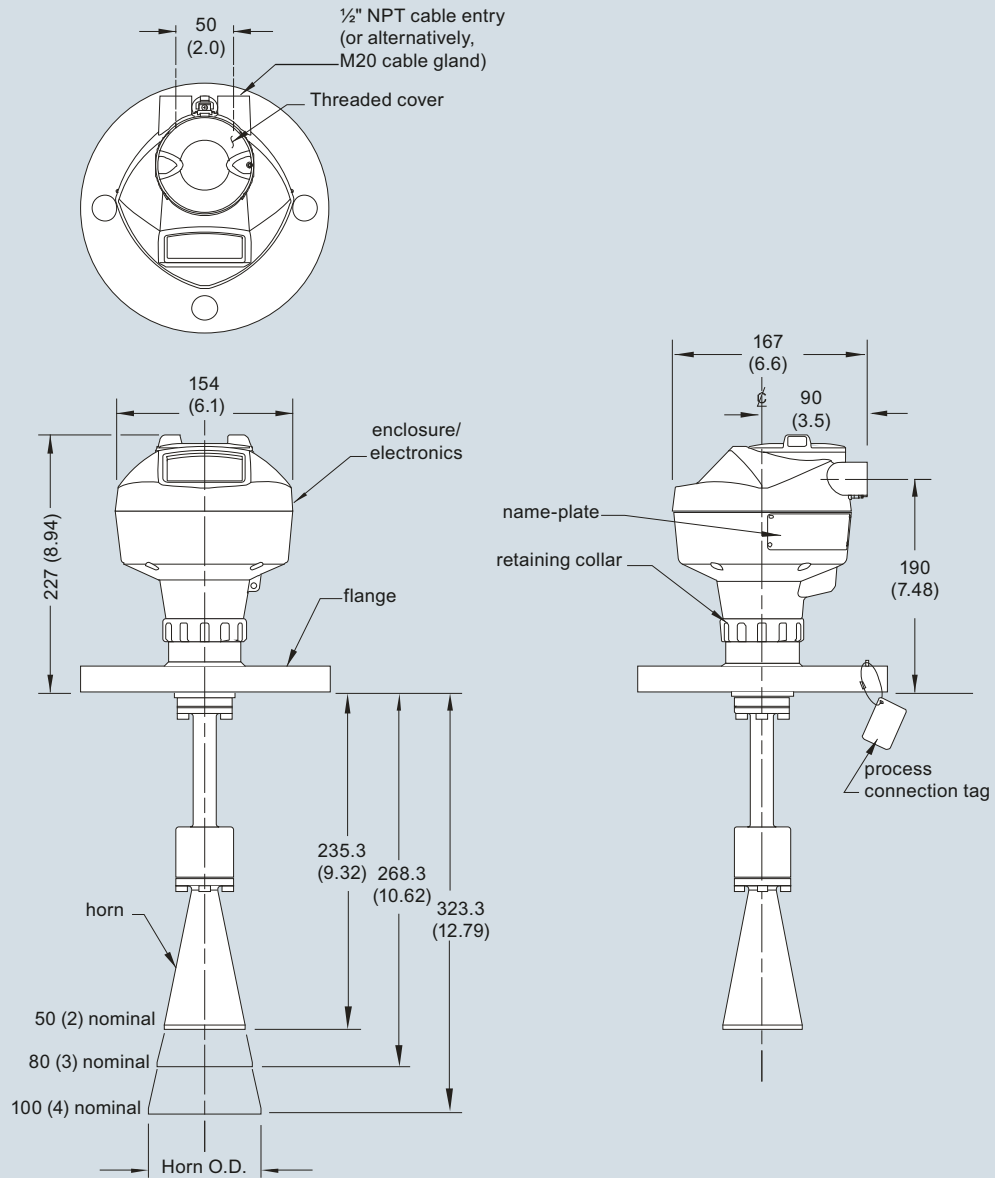
Flanged Horn



Nominal Horn Size	Horn O.D.	Height to sensor reference point		Beam angle	Measurement range
		Stainless steel flange raised or flat-faced	Optional alloy flange		
50 (2)	47.8 (1.88)	135.3 (5.32)	138.3 (5.44)	19 degrees	10 m (32.8 ft)
80 (3)	74.8 (2.94)	168.3 (6.62)	171.3 (6.74)	15 degrees	20 m (65.6 ft)
100 (4)	94.8 (3.73)	223.3 (8.79)	226.3 (8.90)	10 degrees	20 m (65.6 ft)

SITRANS LR250 Flanged Horn Antenna, dimensions in mm (inch)

Flanged Horn with Extension



Nominal Horn Size	Horn O.D.	Height to sensor reference point		Beam angle	Measurement range
		Stainless steel flange raised or flat-faced	Optional alloy flange		
50 (2)	47.8 (1.88)	235.3 (9.32)	238.3 (9.44)	19 degrees	10 m (32.8 ft)
80 (3)	74.8 (2.94)	268.3 (10.62)	271.3 (10.74)	15 degrees	20 m (65.6 ft)
100 (4)	94.8 (3.73)	323.3 (12.79)	326.3 (12.90)	10 degrees	20 m (65.6 ft)

SITRANS LR250 Flanged Horn Antenna with Extension, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Horn Antenna

Schematics

4

Connect the wires to the terminals as shown: the polarity is identified on the terminal block.

Shield for HART, PROFIBUS PA, and FOUNDATION Fieldbus Intrinsically Safe versions only.

Gland

Hand Programmer

SIEMENS			
1	2	3	4
5	6	7	8
9	0	.	+/−
C	↶	↷	↵
←	↑	↓	→




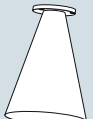
Part number:
7ML1930-1BK

Notes:

1. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

SITRANS LR250 connections

Selection and ordering data

SITRANS LR250 Specials		SITRANS LR250 Specials	
	Article No.		Article No.
SITRANS LR250 horn version enclosures (PROFIBUS PA models)		SITRANS LR250 horn version enclosures (< 3.6 mA start-up HART)	
			
LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E01156836	SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E02956317
LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E01156838	SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection	A5E02956319
LR250 horn version enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E01156839	SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection	A5E02956320
LR250 horn version enclosure with board stack, M20 cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E01156841	SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option F, with HART communication start-up at < 3.6 mA, no process connection	A5E02956322
LR250 horn version enclosure with board stack, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E01156843	SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection	A5E02956323
LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E01156844	LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E03441096
LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E01156846	LR250 horn version enclosure with board stack, NPT cable inlet, approval option B, with HART communication start-up at < 3.6 mA, no process connection	A5E03441097
LR250 horn version enclosure with board stack, M20 cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E01156848	LR250 horn version enclosure with board stack, NPT cable inlet, approval option D, with HART communication start-up at < 3.6 mA, no process connection	A5E03441098
LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION FIELDBUS communication, no process connection	A5E03769538	LR250 horn version enclosure with board stack, NPT cable inlet, approval option H, with HART communication start-up at < 3.6 mA, no process connection	A5E03441099
LR250 enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION FIELDBUS communication, no process connection	A5E03769539		
LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION FIELDBUS communication, no process connection	A5E03769543		
SITRANS LR250 horn version enclosures (FOUNDATION Fieldbus models)		SITRANS LR250 horn antenna and extension kits	
			
LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E02654608	38 mm (1.5 inch) horn antenna kit, 1.5" Process Connections only	A5E01151539
LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E02653792	100 mm (4 inch) horn antenna extension kit, 1.5" Process Connections only	A5E01151553
LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E02653793	50 mm (2 inch) stainless steel 316L horn antenna kit	A5E01151569
LR250 horn version enclosure with board stack, NPT cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E02654606	75 mm (3 inch) stainless steel 316L horn antenna kit	A5E01151571
		100 mm (4 inch) stainless steel 316L horn antenna kit	A5E01151573
		100 mm (4 inch) horn antenna extension kit, 50 mm (2 inch), 75 mm (3 inch) and 100 mm (4 inch) process connection	A5E01151577
		50 mm (2 inch) horn antenna kit, Hastelloy C-22	A5E01151584
		75 mm (3 inch) horn antenna kit, Hastelloy C-22	A5E01151585
		100 mm (4 inch) horn antenna kit, Hastelloy C-22	A5E01151587
		5 Dupont 1Gr Polyback, PTFE grease kit	A5E01151626
		LR250 lid with O-ring	A5E02465410

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 threaded PVDF antenna

Overview



SITRANS LR250 with threaded PVDF antenna is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including corrosives or aggressive materials, to a range of 10 m (32.8 ft) or 20 m (66 ft) when used in a stilling pipe.

Benefits

- Fully insulated PVDF antenna design for use in chemical and sanitary environments where aggressive and corrosive materials are used
- Cost effective replacement for transmitters made of exotic materials
- Graphical local user interface (LUI) makes operation simple with plug-and-play setup using the intuitive Quick Start Wizard
- LUI displays echo profiles for diagnostic support
- 25 GHz high frequency and 50 mm (2 inch) process connection/antenna allow for easy mounting in nozzles
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Short blanking distance for improved minimum measuring range to 50 mm (2 inch) from the end of the antenna
- Communication using HART or PROFIBUS PA, or FOUNDATION Fieldbus
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or over a network using SIMATIC PDM, Emerson AMS, or Field Device Tools, such as PACTware or Fieldcare via SITRANS DTM.
- Suitable for use in Safety Related Systems in accordance with IEC 61508/61511 (SIL-2)
- 3 mm (0.118 inch) accuracy in accordance with IEC 60770-1

Application

SITRANS LR250 includes a graphical local user interface (LUI) that improves setup and operation by including an intuitive Quick Start Wizard, and echo profile displays for diagnostic support. Start-up is easy using the Quick Start wizard with a few parameters required for basic operation.

The 25 GHz frequency creates a narrow, focused beam allowing for smaller antenna options and decreasing sensitivity to obstructions.

SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid.

SITRANS LR250 measures superbly in small vessels and in tanks/vessels up to 10 m (32 ft) on materials with $dk > 3$ or 20 m (66 ft) when used in a stilling pipe with $dk \geq 1.6$.

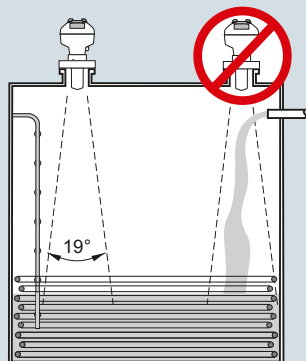
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 80 °C (176 °F), corrosive and aggressive materials and applications requiring functional safety

Configuration

Installation

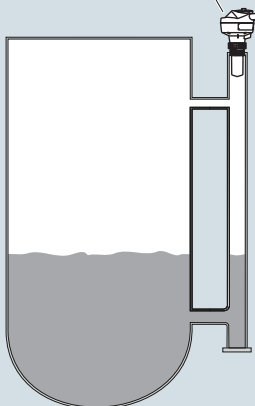
Note:

- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



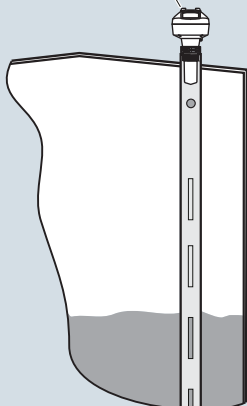
Mounting unit on bypass

Orient front or back of device toward vent.

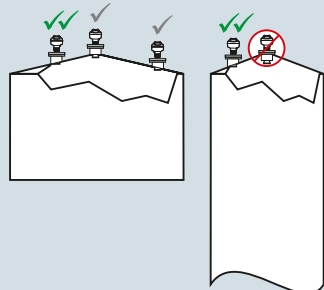


Mounting unit on stilling well

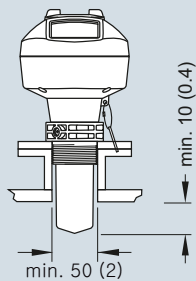
Orient front or back of device toward stillpipe slots.



Mounting unit on vessel



Mounting on a nozzle



SITRANS LR250 PVDF antenna installation, dimensions in mm (inch)


Level Measurement

Continuous level measurement – Radar transmitters



SITRANS LR250 threaded PVDF antenna

Technical specifications

Mode of operation		Power supply	
Measuring principle	Radar level measurement	4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
Frequency	K-band (25.0 GHz)	PROFIBUS PA	<ul style="list-style-type: none"> 15 mA per IEC 61158-2
Minimum measuring range	50 mm (2 inch) from end of antenna	FOUNDATION Fieldbus	<ul style="list-style-type: none"> 20.0 mA per IEC 61158-2
Maximum measuring range	10 m (32.8 ft) or 20 m (66 ft) when used in a stilling pipe with $dk \geq 1.6$	Certificates and approvals	
Output		General	
HART	Version 5.1	Radio	
<ul style="list-style-type: none"> Analog output Accuracy Fail-safe 	4 ... 20 mA ± 0.02 mA <ul style="list-style-type: none"> Programmable as high low or hold (loss of echo) NE 43 programmable 	CSA _{US/C} , CE, FM, NE 21, RCM FCC, Industry Canada and Europe ETSI EN 302-372, RCM	
PROFIBUS PA	Profile 3.1	Hazardous	
<ul style="list-style-type: none"> Function blocks 	2 Analog Input (AI)	<ul style="list-style-type: none"> Explosion Proof (Brazil) 	
FOUNDATION Fieldbus	H1	<ul style="list-style-type: none"> Increased Safety (Brazil) 	
<ul style="list-style-type: none"> Functionality Version Function blocks 	Basic or LAS ITK 5.2.0 2 Analog Input (AI)	<ul style="list-style-type: none"> Intrinsically Safe (Brazil) Explosion Proof (Canada/USA) 	
Performance (according to reference conditions IEC60770-1)		<ul style="list-style-type: none"> Intrinsically Safe (Canada/USA) 	
Maximum measured error	<ul style="list-style-type: none"> > 500 mm from sensor reference point: 3 mm (0.118 inch) < 500 mm from sensor reference point: 25 mm (1 inch) 	<ul style="list-style-type: none"> Explosion Proof (China) 	
Influence of ambient temperature	< 0.003 %/K	<ul style="list-style-type: none"> Flame Proof/Increased Safety (China) Intrinsically Safe (China) 	
Rated operating conditions		<ul style="list-style-type: none"> Non-sparking (China) Intrinsically Safe (Europe) 	
Installation conditions	Indoor/outdoor	<ul style="list-style-type: none"> Non-sparking/Energy Limited (Europe) Flame Proof (International/Europe) 	
Location	Indoor/outdoor	<ul style="list-style-type: none"> Increased Safety (International/Europe) Intrinsically Safe (International) 	
Ambient conditions (enclosure)		<ul style="list-style-type: none"> Explosion Proof (Russia) Increased Safety (Russia) Intrinsically Safe (Russia) Marine 	
Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)	Functional Safety	
Installation category	I	SIL-2 suitable in accordance with IEC 61508/61511	
Pollution degree	4	Programming	
Medium conditions		Intrinsically Safe Siemens handheld programmer	
Dielectric constant ϵ_r	≥ 3 (1.6 in stillpipe)	<ul style="list-style-type: none"> Approvals for handheld programmer 	
Process temperature	-40 ... +80 °C (-40 ... +176 °F) at process connection (Is suitable for CIP at 120 °C for 1/2 hr max.)	IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135°C T _a = -20 ... +50 °C CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, T6 T _a = +50 °C IECEx SIR 09.0073	
Process pressure	Up to 5 bar g (72 psi g) temperature dependent. See Pressure/Temperature curves for more information	HART communicator 375/475 <ul style="list-style-type: none"> SIMATIC PDM Emerson AMS SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare) 	
Design		Handheld communicator PC	
Enclosure		Display (local)	
<ul style="list-style-type: none"> Material Cable inlet 	Aluminum, polyester powder-coated 2 x M20x1.5 or 2 x 1/2" NPT	Graphic local user interface including quick start wizard and echo profile display	
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68		
Weight	approximately 3.3 kg (7.27 lb)		
Display (local)			
Antenna			
<ul style="list-style-type: none"> Material Dimensions (nominal sizes) 	PVDF (Polyvinylidene fluoride) 2 inch (48 mm)		
Process connections			
Process connection	2" NPT [(Taper), ASME B1.20.1] 2" [(BSPT), EN 10226] 2" [(BSPP), EN ISO 228-1]		

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LR250 threaded PVDF antenna 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including corrosives or aggressive materials, to a range of 10 m (32.8 ft) or 20m (66ft) when used in a stilling pipe. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5431- 	Further designs Please add "-Z" to Article No. and specify Order code(s).	
Process Connection and Antenna Material Threaded PVDF antenna	4	Plug M12 with mating Connector ¹⁾²⁾³⁾	A50
Process Connection Type Threaded connections PVDF 2" NPT (ASME B1.20.1) (tapered thread) R 2" [(BSPT), EN 10226-1] (tapered thread) G 2" [(BSPP), EN ISO 228-1] (parallel thread)	PA PB PC	Plug 7/8" with mating Connector ²⁾³⁾⁴⁾	A55
Communication/Output PROFIBUS PA 4 ... 20 mA, HART, start-up at < 3.6 mA FOUNDATION Fieldbus	1 2 3	Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	Y15
Enclosure/Cable inlet Aluminum, Epoxy painted 2 x 1/2" NPT 2 x M20x1.5	0 1	Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Antenna 2 inch(50 mm) threaded PVDF antenna	R	Inspection Certificate Type 3.1 per EN 10204	C12
Approvals General Purpose, CE, CSA, FM, FCC, R&TTE, RCM Intrinsically Safe: CSA/FM Class I, Div. 1, Groups A, B, C, D, Class II, Div.1, Groups E, F, G, Class III T4 FCC, Industry Canada Intrinsically Safe: IECEX/ATEX II 1 G Ex ia IIC T4 Ga, IECEX/ATEX II 1D Ex ia ta IIIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, R&TTE, RCM Increased Safety: IECEX/ATEX II 1/2 GD, 1D, 2D Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ¹⁾ Flameproof: IECEX/ATEX II 1/2 GD 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ¹⁾ Explosion proof: CSA/FM Class I, II and III, Div.1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ¹⁾ Non Sparking: NEPSI Ex nA IIC T4 Gc Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ¹⁾ Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ¹⁾	A B C D E F G H K L M N	Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ⁵⁾⁶⁾	C20
Pressure rating Rating per Pressure/Temperature curves in manual	2	Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁵⁾	N07
		Operating Instructions for HART/mA device	Article No. A5E32220602 A5E32376088
		English German Note: The Operating Instructions should be ordered as a separate line item on the order.	
		Compact Operating Instructions for HART/mA device	A5E33469191 A5E33469171
		English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.	
		Operating Instructions for PROFIBUS PA device	A5E32221386 A5E32376094
		English German Note: The Operating Instructions should be ordered as a separate line item on the order.	
		Compact Operating Instructions for PROFIBUS PA device	A5E33469239 A5E33472685
		English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.	
		We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.	

¹⁾ Applicable to Communication option 2 only

 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 threaded PVDF antenna

Selection and Ordering data

Article No.

Operating Instructions for FOUNDATION Fieldbus device

English

A5E32221411

German

A5E32376112

Note: The Operating Instructions should be ordered as a separate line item on the order.

Compact Operating Instructions for FOUNDATION Fieldbus device

English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish

A5E33472700

English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian

A5E33472738

This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.

Selection and Ordering data

Article No.

Accessories

Handheld programmer, Intrinsically safe, EEx ia

7ML1930-1BK

HART modem/USB
(for use with a PC and SIMATIC PDM)

7MF4997-1DB

One metallic cable gland M20x1.5,
rated -40 ... +80 °C (-40 ... +176 °F), HART

7ML1930-1AP

One metallic cable gland M20x1.5,
rated -40 ... +80 °C (-40 ... +176 °F),
PROFIBUS PA and FOUNDATION Fieldbus²⁾

7ML1930-1AQ

FDA approved FKM o-ring for 2" G (BSPP) process
connections -28 ... +80 °C (-28 ... +176 °F)

7ML1830-3AN

SITRANS RD100, loop powered display -
see Chapter 7

7ML5741-...

SITRANS RD200, universal input display with
Modbus conversion - see Chapter 7

7ML5740-...

SITRANS RD300, dual line display with totalizer
and linearization curve and Modbus conversion -
see Chapter 7

7ML5744-...

SITRANS RD500 web, universal remote monitoring
solution for instrumentation - see Chapter 7

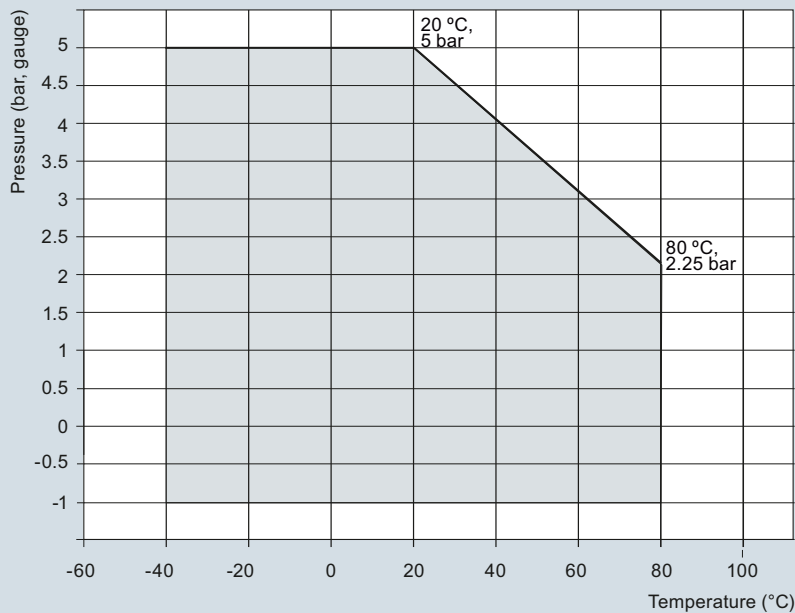
7ML5750-...

For applicable back up point level switch -
see point level measurement section

- 1) Available with Enclosure option 1 only
- 2) To be used with Communication options 1 and 3 only.
Connector has IP67 rating.
- 3) Available with Approval options A and B. Available with approval option C
for use on intrinsically safe applications only. Not rated for dust Ex.
- 4) Available with Enclosure option 0 only
- 5) Available with communication option 2 only
- 6) Available with approval options A ... E only

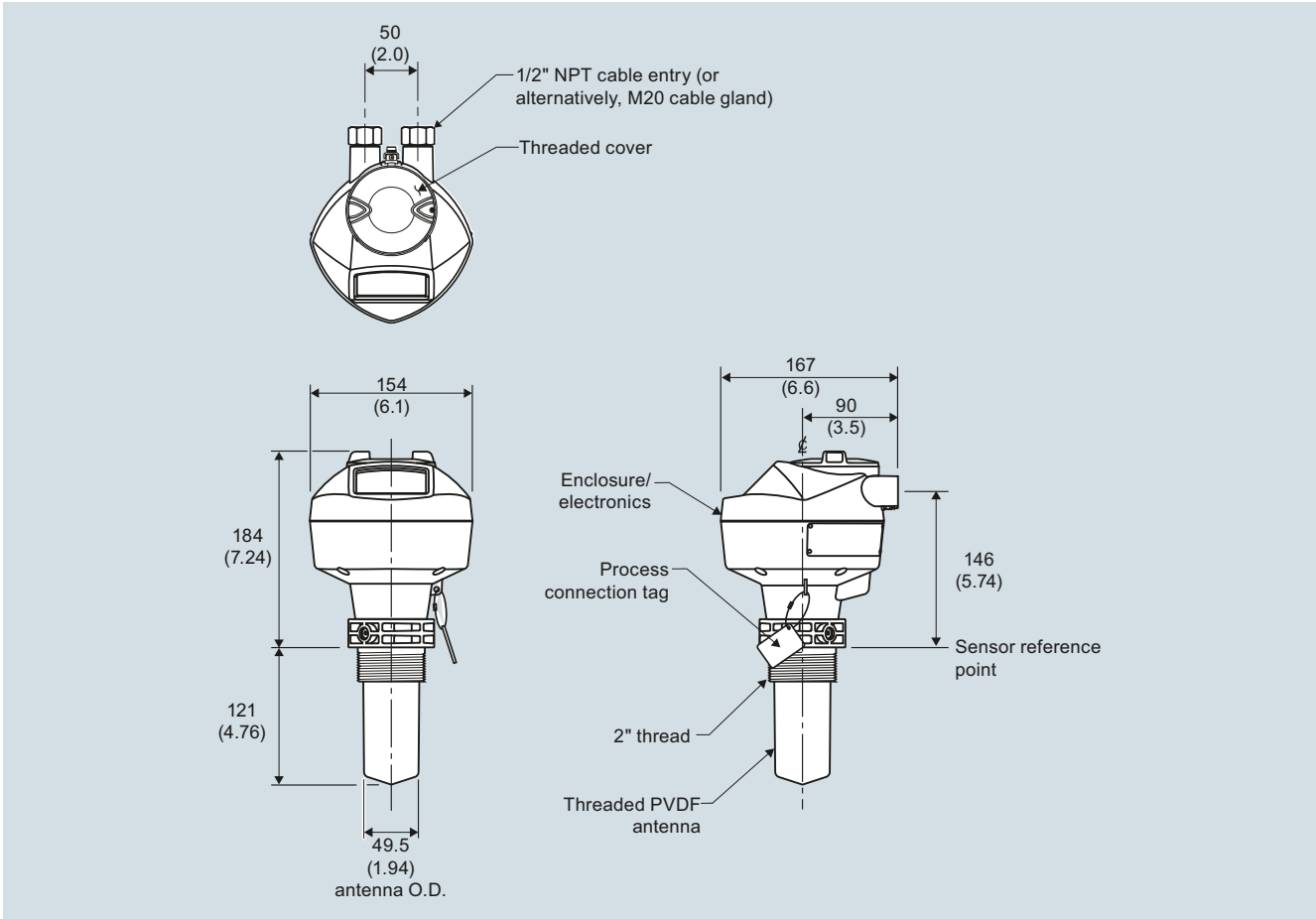
Characteristic curves

Pressure/Temperature Curve



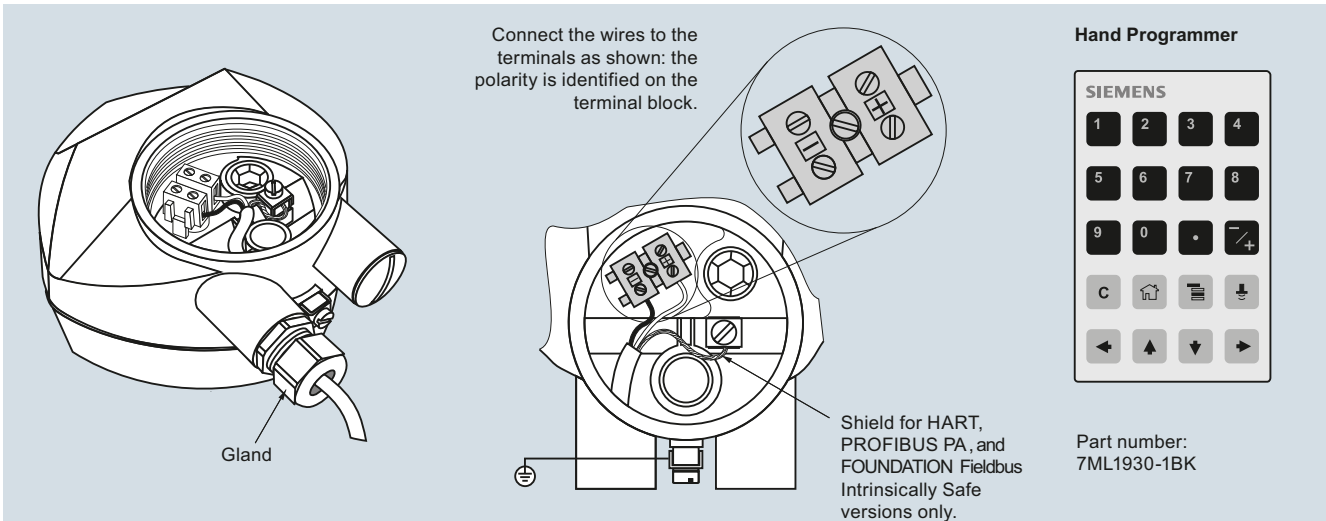
SITRANS LR250 PVDF antenna pressure/temperature curve

Dimensional drawings



SITRANS LR250 PVDF antenna, dimensions in mm (inch)

Schematics



Notes:

1. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 threaded PVDF Specials

Selection and ordering data

SITRANS LR250 threaded PVDF Specials

	Article No.
SITRANS LR250 threaded PVDF antenna version enclosures (PROFIBUS PA models)	
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E03588171
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E03588253
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E03588512
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E03589260
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E03589262
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection	A5E03589264
SITRANS LR250 threaded PVDF antenna version enclosures (FOUNDATION Fieldbus models)	
LR250 enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589266
LR250 enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589275
LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E03589277
LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E03589280
LR250 enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E03589281
LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E03589283

SITRANS LR250 threaded PVDF Specials

	Article No.
SITRANS LR250 threaded PVDF antenna version enclosures (< 3.6 mA start-up HART models)	
LR250 enclosure with board stack, M20 cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E03569747
LR250 enclosure with board stack, NPT cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E03586807
LR250 enclosure with board stack, NPT cable inlet, approval option B, with HART communication start-up at < 3.6 mA, no process connection	A5E03586854
LR250 enclosure with board stack, M20 cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection	A5E03586887
LR250 enclosure with board stack, NPT cable inlet, approval option D, with HART communication start-up at < 3.6 mA, no process connection	A5E03586961
LR250 enclosure with board stack, M20 cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection	A5E03587012
LR250 enclosure with board stack, M20 cable inlet, approval option F, with HART communication start-up at < 3.6 mA, no process connection	A5E03587132
LR250 enclosure with board stack, M20 cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection	A5E03587223
LR250 enclosure with board stack, NPT cable inlet, approval option H, with HART communication start-up at < 3.6 mA, no process connection	A5E03588125
SITRANS LR250 threaded PVDF antenna kits	
Antenna kit 2" NPT threaded PVDF	A5E03528941
Antenna kit 2" R (BSPT) threaded PVDF	A5E03528943
Antenna kit 2" G (BSPP) threaded PVDF	A5E03528947
Kit of hardware parts for LR250 threaded PVDF antenna: consists of O-rings, screws, wavewasher and loctite	A5E03528948

SITRANS LR250 Flanged Encapsulated Antenna

Overview



SITRANS LR250 with flanged encapsulated antenna is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including corrosives or aggressive materials, to a range of 20 m (66 ft) (antenna dependent).

Benefits

- Fully encapsulated horn antenna design with FDA approved TFM 1600 PTFE lens for use in chemical and sanitary environments where aggressive and corrosive materials are used
- Cost effective replacement for transmitters made of exotic materials
- Graphical local user interface (LUI) makes operation simple with plug-and-play setup using the intuitive Quick Start Wizard
- LUI displays echo profiles for diagnostic support
- 25 GHz high frequency and 50 mm (2 inch) process connection/antenna allow for easy mounting
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Short blanking distance for improved minimum measuring range to 50 mm (2 inch) from the end of the antenna
- Communication using HART, PROFIBUS PA, or FOUNDATION Fieldbus
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or over a network using SIMATIC PDM, Emerson AMS, or Field Device Tools, such as PACWare or Fieldcare via SITRANS DTM
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511

Application

SITRANS LR250 includes a graphical local user interface (LUI) that improves setup and operation by including an intuitive Quick Start Wizard, and echo profile displays for diagnostic support. Start-up is easy using Quick Start Wizard with a few parameters required for basic operation.

The 25 GHz frequency creates a narrow, focused beam allowing for smaller antenna options and decreasing sensitivity to obstructions.

SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid.

SITRANS LR250 measures superbly in small vessels and in tanks/vessels up to 20 m (66 ft) on materials with $dk > 1.6$.

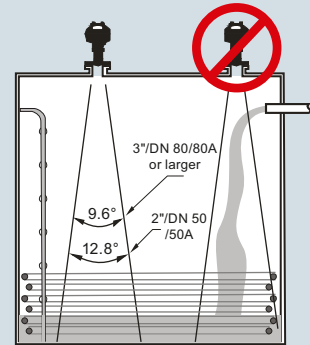
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 170 °C (338 °F), corrosive and aggressive materials and applications where ease of cleaning is required, such as food or fine chemicals.

Configuration

Installation

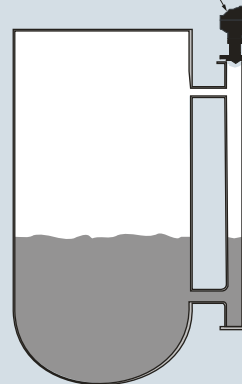
Note:

- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



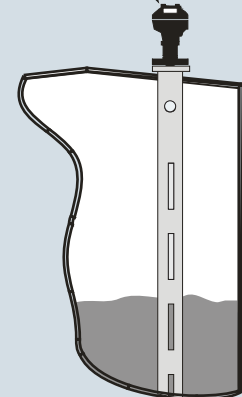
Mounting unit on bypass

Orient front or back of device toward vent.

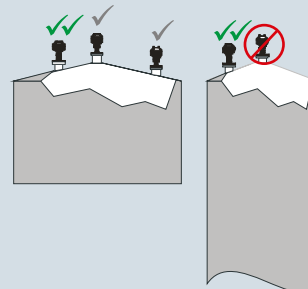


Mounting unit on stilling well

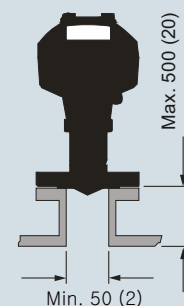
Orient front or back of device toward stillpipe slots.



Mounting unit on vessel



Mounting on a nozzle



SITRANS LR250 flanged encapsulated antenna installation, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Flanged Encapsulated Antenna

Technical specifications

Mode of operation		Process connections	
Measuring principle	Radar level measurement	Flanged connection	Raised Face
Frequency	K-band (25.0 GHz)		<ul style="list-style-type: none"> • 2, 3, 4, 6" Class 150 ASME B16.5 • 50A, 80A, 100A, 150A 10K JIS B 2220 • DN 50, DN 80, DN 100 & DN 150 PN 10/16 EN 1092-1 type B1
Minimum measuring range	50 mm (2 inch) from end of antenna		
Maximum measuring range	20 m (66 ft)		
Output		Power supply	
HART	Version 5.1	4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
• Analog output	4 ... 20 mA	PROFIBUS PA	<ul style="list-style-type: none"> • 15 mA • Per IEC 61158-2
• Accuracy	± 0.02 mA	FOUNDATION Fieldbus	<ul style="list-style-type: none"> • 20.0 mA • Per IEC 61158-2
• Fail-safe	<ul style="list-style-type: none"> • Programmable as high low or hold (loss of echo) • NE 43 programmable 		
PROFIBUS PA	Profile 3.01		
• Function blocks	2 Analog Input (AI)		
FOUNDATION Fieldbus	H1		
• Functionality	Basic or LAS		
• Version	ITK 5.2.0		
• Function blocks	2 Analog Input (AI)		
Performance (according to reference conditions IEC60770-1)		Certificates and approvals	
Maximum measured error	<ul style="list-style-type: none"> • > 500 mm from sensor reference point: 3 mm (0.118 inch) • < 500 mm from sensor reference point: 25 mm (1 inch) 	General	CSA _{US/C} , CE, FM, NE 21, RCM
Influence of ambient temperature	< 0.003 %/K	Radio	FCC, Industry Canada and Europe ETSI EN 302-372, RCM
Rated operating conditions		Hazardous	
Installation conditions		• Explosion Proof (Brazil)	INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
Location	Indoor/outdoor	• Increased Safety (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
Ambient conditions (enclosure)		• Intrinsically Safe (Brazil)	INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da
Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)	• Explosion Proof (Canada/USA)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
Installation category	I	• Intrinsically Safe (Canada/USA)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
Pollution degree	4	• Non-incendive (Canada/USA)	CSA/FM Class I, Div. 2, Groups A, B, C, D T5
Medium conditions		• Flame Proof/Increased Safety (China)	NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C
Dielectric constant ε _r	≥ 1.6 (antenna dependent)	• Intrinsically Safe (China)	NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C
Process temperature	-40 ... +170 °C (-40 ... +338 °F) at process connection	• Non-sparking/Energy Limited (China)	NEPSI Ex nA IIC T4 Gc
Process pressure	See Pressure/Temperature curves for more information (page 4/237)	• Intrinsically Safe (Europe)	ATEX II 1G Ex ia IIC T4 Ga ATEX II 1D Ex ia ta IIIC T100 °C Da ATEX II 3G Ex nA IIC T4 Gc
Design		• Non-sparking/Energy Limited (Europe)	IECEX/ATEX II 1/2 GD, 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
Enclosure		• Flame Proof (International/Europe)	IECEX/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Material	Aluminum, polyester powder-coated	• Increased Safety (-International/Europe)	IECEX/ATEX II 1 G Ex ia IIC T4 Ga, IECEX/ATEX II 1D Ex ia ta IIIC T100 °C Da
• Cable inlet	2 x M20x1.5 or 2 x ½" NPT	• Intrinsically Safe (International)	GOST-R Ex d GOST-R Ex e GOST-R Ex ia
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68	• Explosion Proof (Russia)	• Lloyd's Register of Shipping
Weight (dependent on process connection)	<ul style="list-style-type: none"> • Approx. 7 kg (15.43 lb) for 2" Class 150 ASME B16.5 raised face flange (smallest size) • Approx. 17.7 kg (39.02 lb) for 6" Class 150 ASME B16.5 raised face flange (largest size) 	• Increased Safety (Russia)	• ABS Type Approval
Display (local)	Graphic local user interface including quick start wizard and echo profile display	• Intrinsically Safe (Russia)	• Bureau Veritas
Antenna		• Marine	
• Material	Stainless Steel 316L (1.4435 or 1.4404) and TFM 1600 PTFE Lens (lens is the only wetted part)	• Functional Safety	SIL-2 suitable in accordance with IEC 61508/61511
• Dimensions (nominal sizes)	48 mm (2 inch), 80 mm (3 inch), 100 mm (4 inch), 150 mm (6 inch)		

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Flanged Encapsulated Antenna

Programming		Selection and Ordering data	Article No.
Intrinsically Safe Siemens handheld programmer	Infrared receiver	SITRANS LR250 flanged encapsulated antenna	7ML5432-
• Approvals for handheld-programmer	IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135 °C T _a = -20 ... +50 °C CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, T6 T _a = 50 °C IECEx SIR 09.0073	2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft) (antenna dependant). Ideal for corrosive, aggressive and low dielectric media.	0 -
Handheld communicator	HART communicator 375/475	➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
PC	• SIMATIC PDM • Emerson AMS • SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare)	Process Connection Material Stainless steel 1.4404/1.4435	0
Display (local)	Graphic local user interface including quick start wizard and echo profile displays	Process Connection Type <u>Flanged Process Connection Types</u> (stainless steel 1.4404/1.4435)	
		2" Class 150 ASME B16.5 raised face ¹⁾	● B F
		3" Class 150 ASME B16.5 raised face	● B G
		4" Class 150 ASME B16.5 raised face	● B H
		6" Class 150 ASME B16.5 raised face	● B J
		50A 10K JIS B 2220 raised face ¹⁾	● F D
		80A 10K JIS B 2220 raised face	● F E
		100A 10K JIS B 2220 raised face	● F F
		150A 10K JIS B 2220 raised face	● F G
		DN 50 PN 10/16 EN 1092-1 type B1 raised face ¹⁾	● G A
		DN 80 PN 10/16 EN 1092-1 type B1 raised face	● G B
		DN 100 PN 10/16 EN 1092-1 type B1 raised face	● G C
		DN 150 PN 10/16 EN 1092-1 type B1 raised face	● G D
		Communication/Output	
		PROFIBUS PA	● 1
		4 ... 20 mA, HART, start-up at < 3.6 mA	● 2
		FOUNDATION Fieldbus	● 3
		Enclosure/Cable inlet	
		Aluminum, Epoxy painted	
		2 x 1/2" NPT	● 0
		2 x M20x1.5	● 1
		Antenna lens material	
		TFM 1600 PTFE Flush Lens	● A
		Approvals	
		General Purpose, CE, CSA, FM, FCC, R&TTE, RCM	● A
		Intrinsically Safe: CSA/FM Class I, Div. 1, Groups A, B, C, D, Class II, Div.1, Groups E, F, G, Class III T4 FCC, Industry Canada	● B
		Intrinsically Safe: IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM	● C
		Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada	● D
		Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, R&TTE, RCM	● E
		Increased Safety: IECEx/ATEX II 1/2 GD, 1D, 2D Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ²⁾	● F
		Flameproof: IECEx/ATEX II 1/2 GD 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ²⁾	● G
		Explosion proof: CSA/FM Class I, II and III, Div.1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ²⁾	● H
		Non Sparking: NEPSI Ex nA IIC T4 Gc	● K
		Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C	● L
		Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ²⁾	● M
		Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ²⁾	● N
		Pressure rating	
		Rating per Pressure/Temperature curves in instruction manual	● 0

¹⁾ Maximum range 10 m (32.8 ft), dk > 3 [20 m (66 ft)] and dk > 1.6 when mounted in stillpipe]

²⁾ Applicable with communication option 2 only

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Flanged Encapsulated Antenna

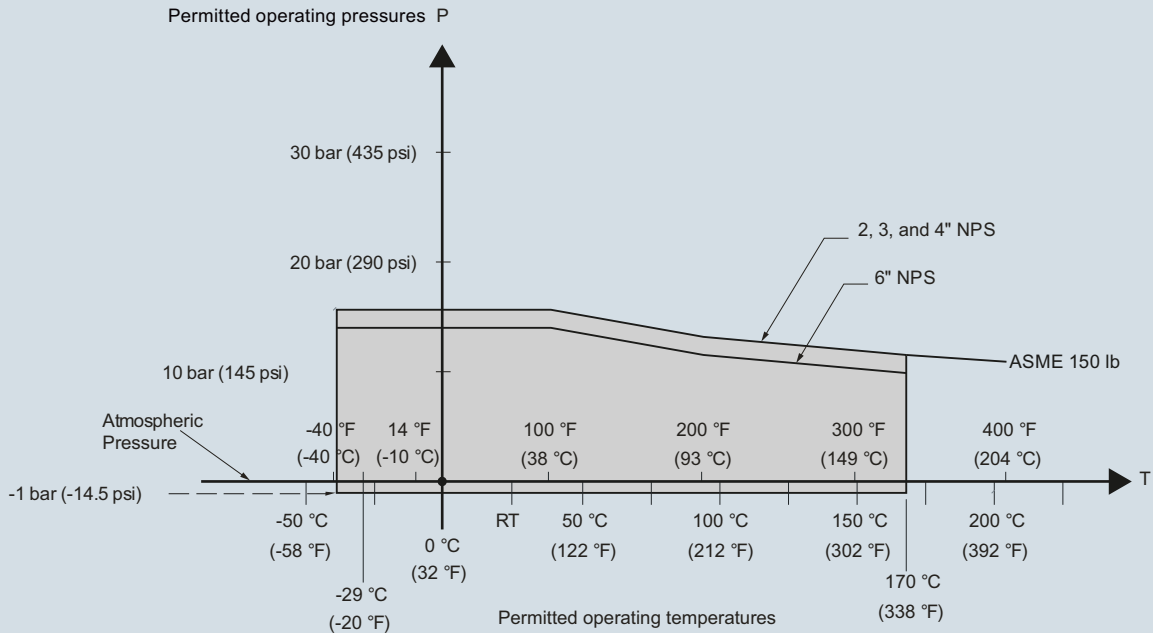
Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs		Operating Instructions for FOUNDATION Fieldbus device	
Please add "-Z" to Article No. and specify Order code(s).		English	A5E32221411
Plug M12 with mating Connector ¹⁾²⁾³⁾	◆ A50	German	A5E32376112
Plug 7/8" with mating Connector ²⁾³⁾⁴⁾	◆ A55	Note: The Operating Instructions should be ordered as a separate line item on the order.	
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	◆ Y15	Compact Operating Instructions for FOUNDATION Fieldbus device	
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	◆ C11	English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	A5E33472700
Inspection Certificate Type 3.1 per EN 10204	◆ C12	English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	A5E33472738
Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ⁵⁾⁶⁾	◆ C20	This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.	
Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁵⁾	◆ N07	Accessories	
Operating Instructions for HART/mA device	Article No.	Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM)	7ML1930-1BK 7MF4997-1DB
English	A5E32220602	One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART (2 are required) ⁶⁾	7ML1930-1AP
German	A5E32376088	One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus (2 are required) ²⁾	7ML1930-1AQ
Note: The Operating Instructions should be ordered as a separate line item on the order.		SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
Compact Operating Instructions for HART/mA device		SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	A5E33469191	SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	A5E33469171	SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.		For applicable back up point level switch - see point level measurement section	
Operating Instructions for PROFIBUS PA device			
English	A5E32221386		
German	A5E32376094		
Note: The Operating Instructions should be ordered as a separate line item on the order.			
Compact Operating Instructions for PROFIBUS PA device			
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	A5E33469239		
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	A5E33472685		
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.			

- 1) Available with enclosure option 1 only
- 2) Available with communication options 1 and 3 only
- 3) Available with approval options A, B, C, and L only
- 4) Available with enclosure option 0 only
- 5) Applicable with communication option 2 only
- 6) Available with approval options A, B, C, D, E, K, and L only

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

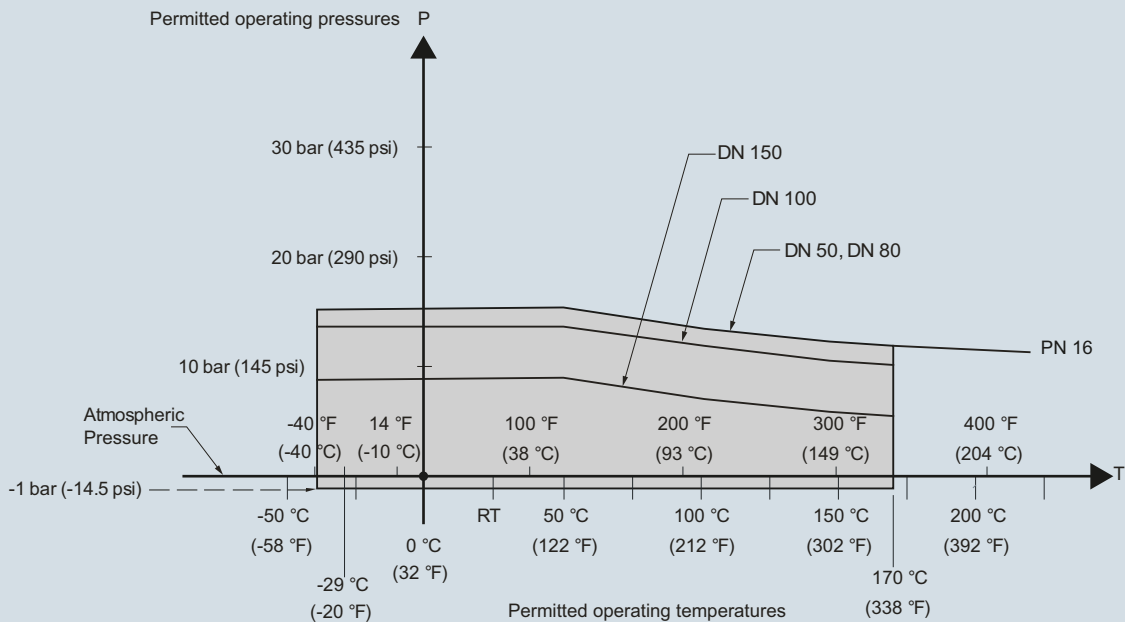
Characteristic curves

Pressure/ temperature curve
LR250 Flanged Encapsulated Antenna
ASME flanged process connections
(7ML5432)



SITRANS LR250 flanged encapsulated antenna pressure/temperature curve

Pressure/ temperature curve
LR250 Flanged Encapsulated Antenna
EN 1092-1 flanged process connections
(7ML5432)



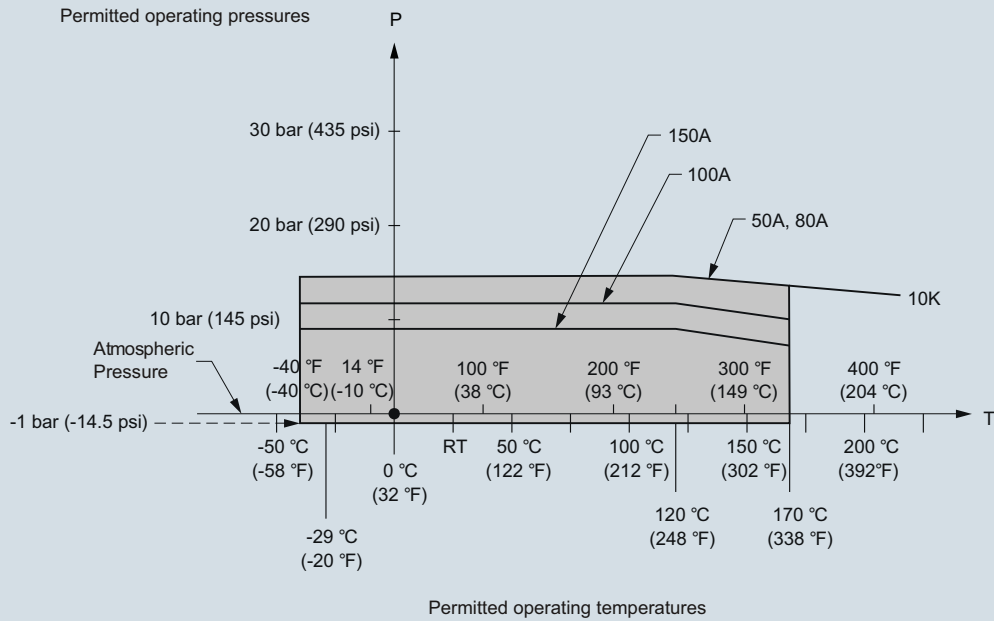
SITRANS LR250 flanged encapsulated antenna pressure/temperature curve

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Flanged Encapsulated Antenna

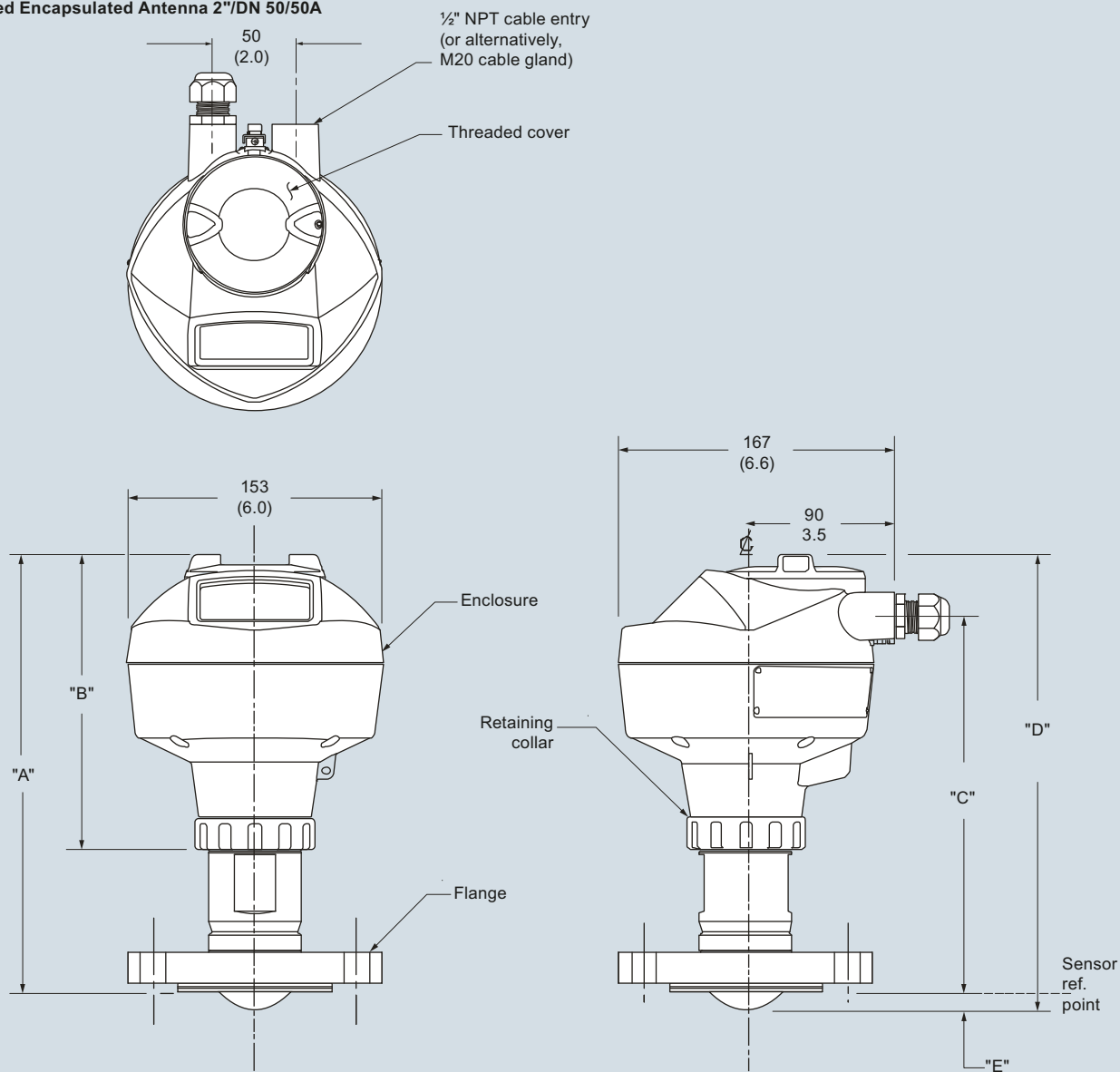
Pressure/ temperature curve
LR250 Flanged Encapsulated Antenna
JIS B 2220 flanged process connections
(7ML5432)



SITRANS LR250 flanged encapsulated antenna pressure/temperature curve

Dimensional drawings

Flanged Encapsulated Antenna 2"/DN 50/50A



Flange Size	Flange Class	Flange O.D.	Antenna aperture size	Height to Sensor reference point dimension E ¹⁾	Beam angle	Measurement Range	Dimension A	Dimension B	Dimension C	Dimension D
2"	150 lb	152 (5.98)	50 (1.97)	11 (0.43)	12.8°	10 m (32.8 ft)	263 (10.35)	178 (7)	223 (8.78)	274 (10.79)
DN 50	PN 10/16	165 (6.50)								
50A	10K	155 (6.10)								

¹⁾ Height from tip of lens to sensor reference point as shown.

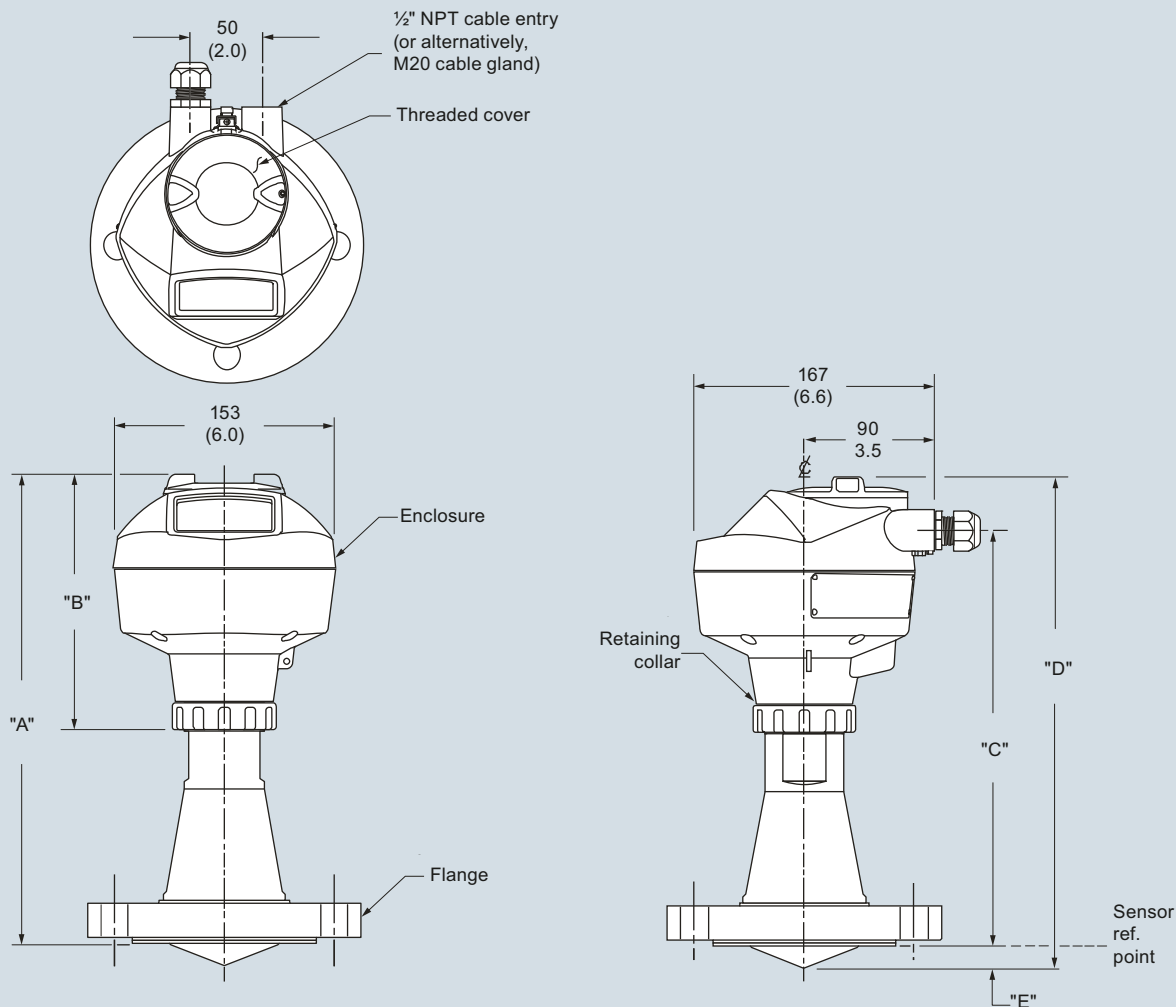
SITRANS LR250 flanged encapsulated antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Flanged Encapsulated Antenna

Flanged Encapsulated Antenna 3"/DN 50/80A or greater



Flange Size	Flange Class	Flange O.D.	Antenna aperture size	Height to Sensor reference point dimension E ¹⁾	Beam angle	Measurement Range	Dimension A	Dimension B	Dimension C	Dimension D
3"	150 lb	190 (7.48)	75 (2.95)	15 (0.59)	9.6°	20 m (65.6 ft)	328 (12.91)	178 (7)	288 (11.34)	343 (13.54)
DN 80	PN 10/16	200 (7.87)								
80A	10K	185 (7.28)								
4"	150 lb	230 (9.06)	75 (2.95)	13 (0.51)	9.6°	20 m (65.6 ft)	328 (12.91)	178 (7)	288 (11.34)	343 (13.50)
DN 100	PN 10/16	220 (8.66)								
100A	10K	210 (8.27)								
6"	150 lb	280 (11.02)	75 (2.95)	15 (0.59)	9.6°	20 m (65.6 ft)	333 (13.11)	178 (7)	293 (11.54)	348 (13.70)
DN 150	PN 10/16	285 (11.25)								
150A	10K	280 (11.02)								

¹⁾ Height from tip of lens to sensor reference point as shown.

SITRANS LR250 flanged encapsulated antenna, dimensions in mm (inch)

Schematics

Connect the wires to the terminals as shown: the polarity is identified on the terminal block.

Shield for HART, PROFIBUS PA, and FOUNDATION Fieldbus Intrinsically Safe versions only.

Hand Programmer

SIEMENS			
1	2	3	4
5	6	7	8
9	0	.	+/−
C	↶	↷	↵
←	↑	↓	→

Part number:
7ML1930-1BK

Notes:

1. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

Gland

SITRANS LR250 connections

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Flanged Encapsulated Specials

Selection and ordering data

SITRANS LR250 flanged encapsulated Specials

	Article No.
SITRANS LR250 flanged encapsulated antenna version enclosures (PROFIBUS PA models)	
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E32462853
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E32462854
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E32462855
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E32462856
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E32462857
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection	A5E32462858
SITRANS LR250 flanged encapsulated antenna version enclosures (FOUNDATION Fieldbus models)	
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E32462859
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E32462860
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E32462861
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E32462862
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E32462863
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E32462864
SITRANS LR250 flanged encapsulated antenna version enclosures (< 3.6 mA start-up HART models)	
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E32462865
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E32462866

SITRANS LR250 flanged encapsulated Specials

	Article No.
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option B, with HART communication start-up at < 3.6 mA, no process connection	A5E32462867
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection	A5E32462868
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option D, with HART communication start-up at < 3.6 mA, no process connection	A5E32462869
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection	A5E32462830
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option F, with HART communication start-up at < 3.6 mA, no process connection	A5E32462831
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection	A5E32462832
LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option H, with HART communication start-up at < 3.6 mA, no process connection	A5E32462833
SITRANS LR250 flanged encapsulated antenna lens kits	
Replacement TFM 1600 Lens and Spring Washer Kit for 2" Class 150 ASME B16.5 raised face	A5E32462817
Replacement TFM 1600 Lens and Spring Washer Kit for 3" Class 150 ASME B16.5 raised face	A5E32462819
Replacement TFM 1600 Lens and Spring Washer Kit for 4" Class 150 ASME B16.5 raised face	A5E32462820
Replacement TFM 1600 Lens and Spring Washer Kit for 6" Class 150 ASME B16.5 raised face	A5E32462821
Replacement TFM 1600 Lens and Spring Washer Kit for 50A 10K JIS B 2220 raised face	A5E32462822
Replacement TFM 1600 Lens and Spring Washer Kit for 80A 10K JIS B 2220 raised face	A5E32462823
Replacement TFM 1600 Lens and Spring Washer Kit for 100A 10K JIS B 2220 raised face	A5E32462824
Replacement TFM 1600 Lens and Spring Washer Kit for 150A 10K JIS B 2220 raised face	A5E32462825
Replacement TFM 1600 Lens and Spring Washer Kit for DN 50 PN 10/16 EN 1092-1 type B1 raised face	A5E32462826
Replacement TFM 1600 Lens and Spring Washer Kit for DN 80 PN 10/16 EN 1092-1 type B1 raised face	A5E32462827
Replacement TFM 1600 Lens and Spring Washer Kit for DN 100 PN 10/16 EN 1092-1 type B1 raised face	A5E32462828
Replacement TFM 1600 Lens and Spring Washer Kit for DN 150 PN 10/16 EN 1092-1 type B1 raised face	A5E32462829

Overview



The SITRANS LR250 hygienic encapsulated antenna is a 2 wire 25 GHz pulse radar level transmitter with sanitary and hygienic approvals for continuous monitoring of liquids, slurries and pastes within the Food, Beverage, chemical, and pharmaceutical industries to a range of 20 m (66 ft) - antenna dependent (Picture shown with accessories sold separately).

Benefits

- Fully encapsulated horn antenna design with FDA approved and USP Class VI compliant, TFM 1600 PTFE lens.
- $0.8 \mu\text{ Ra}$ surface finish for maximum cleanability and hygiene requirements commonly required in sanitary environments
- Chemically resistant TFM 1600 PTFE lens is also suitable for aggressive or corrosive materials
- Approved device in accordance with 3-A, EHEDG EL Class I and/or EHEDG EL Aseptic Class I
- Cost effective replacement for transmitters made of exotic materials
- Graphical local user interface (LUI) makes operation simple with plug-and-play set-up using the intuitive Quick Start Wizard
- Industry standard process connections including ISO 2852, DIN 11851, DIN 11864-1, DIN 11864-2, DIN 11864-3 and Tuchenhagen Varivent Type F and N
- LUI displays echo profiles for diagnostic support
- 25 GHz high frequency and 2 inch (50 mm) process connection/antenna allow for easy mounting
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Communication using HART, PROFIBUS PA, or FOUNDATION Fieldbus
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or over a network using SIMATIC PDM, Emerson AMS, or Field Device Tools, such as PACTware or Fieldcare via SITRANS DTM.
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511

Application

SITRANS LR250 includes a graphical local user interface (LUI) that improves set-up and operation by including an intuitive Quick Start Wizard, and echo profile displays for diagnostic support. Start-up is easy using the Quick Start wizard with few parameters required for basic operation.

The 25 GHz frequency creates a narrow, focused beam allowing for smaller antenna options and decreasing sensitivity to obstructions.

SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid.

SITRANS LR250 measures superbly in small vessels and in tanks/vessels up to 20 m (66 ft) on materials with $dk > 1.6$.

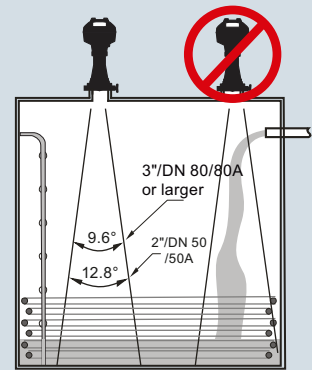
- Key Applications: applications within the Food, Beverage, Chemical and Pharmaceutical industries where sanitary, aseptic or hygienic approvals are required or easy install/clean flush antennas are preferable, such as ice cream, fruit juice, milk, beer, and pharmaceutical or chemical additives and ingredients.

Configuration

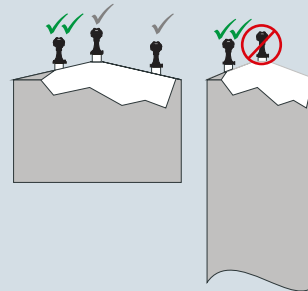
Installation

Note:

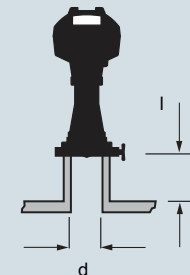
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



Mounting unit on vessel



Mounting on a nozzle



Nozzles should be maximum l/d ratio 1:1 (Eg. 50 mm length, 50 mm diameter)

SITRANS LR250 Hygienic Encapsulated Antenna Installation, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Technical specifications

Mode of Operation	
Measuring principle	Radar level measurement
Frequency	K-band (25.0 GHz)
Minimum measuring range	50 mm (2 inch) from end of antenna
Maximum measuring range	20 m (66 ft)
Output	
HART	Version 5.1
• Analog output	4 ... 20 mA
• Accuracy	± 0.02 mA
• Fail-safe	<ul style="list-style-type: none"> Programmable as high low or hold (loss of echo) NE 43 programmable
PROFIBUS PA	Profile 3.01
• Function blocks	2 Analog Input (AI)
FOUNDATION Fieldbus	H1
• Functionality	Basic or LAS
• Version	ITK 5.2.0
• Function blocks	2 Analog Input (AI)
Performance (according to reference conditions IEC60770-1)	
Maximum measured error	<ul style="list-style-type: none"> > 500 mm from sensor reference point: 3 mm (0.118 inch) < 500 mm from sensor reference point: 25 mm (1 inch)
Influence of ambient temperature	< 0.003 %/K
Rated operating conditions	
Installation conditions	
Location	Indoor/outdoor
Ambient conditions (enclosure)	
Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)
Installation category	I
Pollution degree	4
Medium conditions	
Dielectric constant ϵ_r	≥ 1.6 (antenna dependent)
Process temperature	-40 ... +170 °C (-40 ... +338 °F) at process connection
Process pressure	See Pressure/Temperature curves for more information
Design	
Enclosure	
• Material	Aluminum, polyester powder coated
• Cable inlet	2 x M20x1.5 or 2 x 1/2" NPT
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68
Weight (dependent on process connection)	<ul style="list-style-type: none"> Approx. 4.7 kg (10.4 lb) for 2" ISO 2852 (smallest size) Approx. 7.9 kg (17.4 lb) for DN 100 DIN 11864-2 (largest size)
Display (local)	Graphic local user interface including quick start wizard and echo profile display
Antenna	
• Material	Stainless steel 316L (1.4435 or 1.4404) and TFM 1600 PTFE Lens (lens is the only wetted part)
• Lens surface finish (R_a)	0.8 µm

Process connections	
Hygienic/Sanitary connections	<ul style="list-style-type: none"> 2", 3" & 4" Sanitary Clamp according to ISO 2852 DN 50, DN 80 & DN 100 Aseptic/Hygienic threaded to DIN 11864-1 [Form A] DN 50, DN 80 & DN 100 Aseptic/Hygienic flanged to DIN 11864-2 [Form A] DN 50, DN 80 & DN 100 Aseptic/Hygienic Clamp according to DIN 11864-3 [Form A] DN 50, DN 80 & DN 100 Hygienic Union according to DIN 11851 Type F (50 mm) & Type N (68 mm) Tuchenhausen Varivent
Power supply	
4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
PROFIBUS PA	<ul style="list-style-type: none"> 15 mA Per IEC 61158-2
FOUNDATION Fieldbus	<ul style="list-style-type: none"> 20.0 mA Per IEC 61158-2
Certificates and approvals	
General	CSA _{US/C} , CE, FM, NE 21, RCM
Radio	FCC, Industry Canada and Europe ETSI EN 302-372, RCM
Hazardous	
• Explosion Proof (Brazil)	INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Increased Safety (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Intrinsically Safe (Brazil)	INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da
• Explosion Proof (Canada/USA)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
• Intrinsically Safe (Canada/USA)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
• Non-incendive (Canada/USA)	CSA/FM Class I, Div. 2, Groups A, B, C, D T5
• Flame Proof/Increased Safety (China)	NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C
• Intrinsically Safe (China)	NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C
• Non-sparking (China)	NEPSI Ex nA IIC T4 Gc
• Intrinsically Safe (Europe)	ATEX II 1G Ex ia IIC T4 Ga ATEX II 1D Ex ia ta IIIC T100 °C Da
• Non-sparking (Europe)	ATEX II 3G Ex nA IIC T4 Gc
• Flame Proof (International/Europe)	IECEX/ATEX II 1/2 GD, 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
• Increased Safety (International/Europe)	IECEX/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Intrinsically Safe (International)	IECEX/ATEX II 1 G Ex ia IIC T4 Ga, IECEX/ATEX II 1D Ex ia ta IIIC T100 °C Da
• Explosion Proof (Russia)	GOST-R Ex d
• Increased Safety (Russia)	GOST-R Ex e
• Intrinsically Safe (Russia)	GOST-R Ex ia
Hygienic/Sanitary	EHEDG EL Class I EHEDG EL Aseptic Class I

Programming

Intrinsically Safe Siemens handheld programmer	Infrared receiver
• Approvals for handheld programmer	IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135 °C Ta = -20 ... +50 °C CSA/FM Class I, II, III, Div. 1., Groups A, B, C, D, E, F, G, T6 Ta = 50 °C IECEX SIR 09.0073
Handheld communicator	HART communicator 375/475
PC	<ul style="list-style-type: none"> • SIMATIC PDM • Emerson AMS • SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare)
Display (local)	Graphic local user interface including quick start wizard and echo profile displays

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Selection and Ordering data	Article No.
SITRANS LR250 hygienic encapsulated antenna	7ML5433-
2-wire, 25 Ghz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, up to a range of 20 m (66 ft) (Antenna dependant). Ideal for Hygienic applications including small vessels and low dielectric media.	0 - A
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Hygienic/Sanitary Approvals	
EHEDG EL Class 1 ¹⁾	1
EHEDG EL Aseptic Class 1 ¹⁾	2
3-A (Tuchenhagen connections only - FC ... FF) ²⁾³⁾	3
EHEDG EL Class I & 3-A (excludes Tuchenhagen connections) ⁴⁾	4
Process Connection Types (all types have TFM1600 PTFE lens)	
<u>316L st/st [1.4435 or 1.4404]</u>	
2" Sanitary Clamp according to ISO 2852 ⁵⁾	AA
3" Sanitary Clamp according to ISO 2852	AB
4" Sanitary Clamp according to ISO 2852	AC
<u>316L st/st (1.4435 or 1.4404) & 304L st/st (1.4301)</u>	
DN 50 Aseptic/Hygienic nozzle/ slotted nut (instrument side) to DIN 11864-1 [Form A] ⁵⁾	BA
DN 80 Aseptic/Hygienic nozzle/ slotted nut (instrument side) to DIN 11864-1 [Form A]	BB
DN 100 Aseptic/Hygienic nozzle/ slotted nut (instrument side) to DIN 11864-1 [Form A]	BC
<u>316L st/st [1.4435 or 1.4404]</u>	
DN 50 Aseptic/Hygienic flanged to DIN 11864-2 [Form A] ⁵⁾	CA
DN 80 Aseptic/Hygienic flanged to DIN 11864-2 [Form A]	CB
DN 100 Aseptic/Hygienic flanged to DIN 11864-2 [Form A]	CC
<u>316L st/st [1.4435 or 1.4404]</u>	
DN 50 Aseptic/Hygienic Clamp according to DIN 11864-3 [Form A] ⁵⁾	DA
DN 80 Aseptic/Hygienic Clamp according to DIN 11864-3 [Form A]	DB
DN 100 Aseptic/Hygienic Clamp according to DIN 11864-3 [Form A]	DC
<u>316L st/st (1.4435 or 1.4404) & 304L st/st (1.4301)</u>	
DN 50 Hygienic nozzle/ slotted nut (instrument side) to DIN 11851 ⁵⁾	EA
DN 80 Hygienic nozzle/ slotted nut (instrument side) to DIN 11851	EB
DN 100 Hygienic nozzle/ slotted nut (instrument side) to DIN 11851	EC
<u>316L st/st [1.4435 or 1.4404]</u>	
Type F (50 mm) Tuchenhagen Varivent (EHEDG only) ⁵⁾	FA
Type N (68 mm) Tuchenhagen Varivent (EHEDG only) ⁵⁾	FB
Type F (50 mm) Tuchenhagen Varivent [3-A only & EPDM process seal -40 °C ... 120 °C (-40 °F ... 248 °F)] ⁵⁾	FC
Type N (68 mm) Tuchenhagen Varivent [3-A only & EPDM process seal -40 °C ... 120 °C (-40 °F ... 248 °F)] ⁵⁾	FD
Type F (50 mm) Tuchenhagen Varivent [3-A only & FKM process seal -20 °C ... 170 °C (-4 °F ... 338 °F)] ⁵⁾	FE
Type N (68 mm) Tuchenhagen Varivent [3-A only & FKM process seal -20 °C ... 170 °C (-4 °F ... 338 °F)] ⁵⁾	FF
EXCLUDE Process Connection - Electronics Head assembly spare only (select all other options as normal)	YY

Selection and Ordering data	Article No.
SITRANS LR250 hygienic encapsulated antenna	7ML5433-
2-wire, 25 Ghz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, up to a range of 20 m (66 ft) (Antenna dependant). Ideal for Hygienic applications including small vessels and low dielectric media.	0 - A
Communication	
PROFIBUS PA	1
4 ... 20 mA HART, start-up at < 3.6 mA	2
FOUNDATION Fieldbus	3
Enclosure (with Cable Inlets)	
Aluminum, Epoxy paint, 2 X ½" NPT	0
Aluminum, Epoxy paint, 2 X M20 x 1.5	1
Approvals	
General Purpose, CE, CSA, FM, FCC, R&TTE, RCM	A
Intrinsically Safe: CSA/FM Class I, Div. 1, Groups A, B, C, D, Class II, Div. 1, Groups E, F, G, Class III T4 FCC, Industry Canada	B
Intrinsically Safe: IECEX/ATEX II 1 GD Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM	C
Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada	D
Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, R&TTE, RCM	E
Increased Safety: IECEX/ATEX II 1/2 GD, 1D, 2D Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ⁶⁾	F
Flameproof: IECEX/ATEX II 1/2 GD 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, R&TTE, RCM ⁶⁾	G
Explosion proof: CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ⁶⁾	H
Non Sparking: NEPSI Ex nA IIC T4 Gc	K
Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 TA 90 °C	L
Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 TA 90 °C ⁶⁾	M
Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 TA 90 °C ⁶⁾	N
Pressure Rating	
Rating per pressure/temperature curves in instruction manual	0
<ul style="list-style-type: none"> • We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix. 	

4

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs Please add "-Z" to Article No. and specify Order code(s).			
<u>Electrical Connection cable entry:</u> Plug M12 (IP 67 rating) with mating connector ²⁾⁷⁾⁸⁾		A50	
Plug 7/8" (IP 67 rating) with mating Connector ²⁾⁸⁾⁹⁾		A55	
<u>Test Certificates</u> Manufacturer's Test Certificate M to DIN 55350, Part 18 and to ISO 9000		C11	
Inspection Certificate 3.1 of EN 10204		C12	
<u>Functional Safety</u> Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ⁶⁾¹⁰⁾		C20	
<u>Namur</u> Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁶⁾		N07	
<u>Tagging</u> Stainless steel tag [69 mm x 50 mm (2.71 x 1.97 inch)] Measuring-point number / identification (max. 27 characters) specify in plain text		Y15	
Operating Instructions for HART/mA device English German Note: The Operating Instructions should be ordered as a separate line item on the order.		Article No. A5E32220602 A5E32376088	
Compact Operating Instructions for HART/ma device English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.		A5E33469191 A5E33469171	
Operating Instructions for PROFIBUS PA device English German Note: The Operating Instructions should be ordered as a separate line item on the order.		A5E32221386 A5E32376094	
Compact Operating Instructions for PROFIBUS PA device English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.		A5E33469239 A5E33472685	
		Operating Instructions for FOUNDATION Fieldbus device English German Note: The Operating Instructions should be ordered as a separate line item on the order.	
		Compact Operating Instructions for FOUNDATION Fieldbus device English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.	
		Accessories Handheld programmer, Intrinsically safe, EEx ia (LUI enabled) HART modem/USB (for use with a PC and SIMATIC PDM) One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART (two are required) ⁶⁾ One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus (two are required) ⁸⁾ SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7 For applicable back up point level switch - see point level measurement section	
		7ML1930-1BK 7MF4997-1DB 7ML1930-1AP 7ML1930-1AQ 7ML5741-... 7ML5740-... 7ML5744-... 7ML5750-...	
		• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix.	
		¹⁾ Available with process connection options AA ... FB & YY only ²⁾ Available with Approval options A, B, C, L only ³⁾ Available with Process connection FC ... FF only ⁴⁾ Available with process connection options AA ... EC & YY only ⁵⁾ Max. range 10 m (32.8 ft), dk > 3 [20 m (66 ft) and dk > 1.6 if installed in a stillpipe] ⁶⁾ Applicable with Communication option 2 only ⁷⁾ Available with Enclosure option 1 only ⁸⁾ Available with Communication options 1 & 3 only. ⁹⁾ Available with Enclosure option 0 only ¹⁰⁾ Available with Approval options A, B, C, D, E, K, L only	

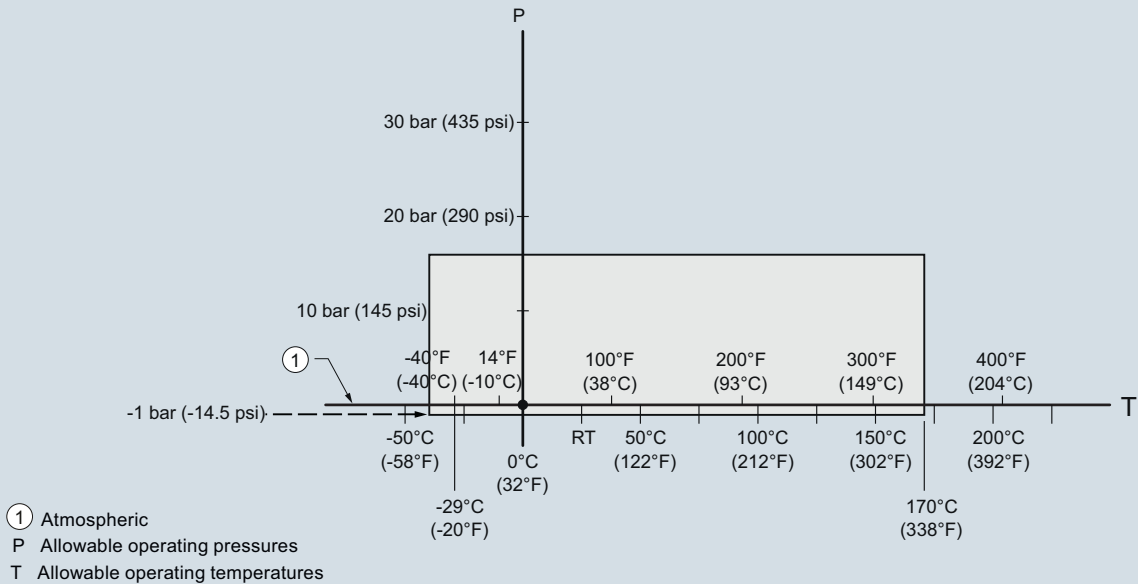
Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

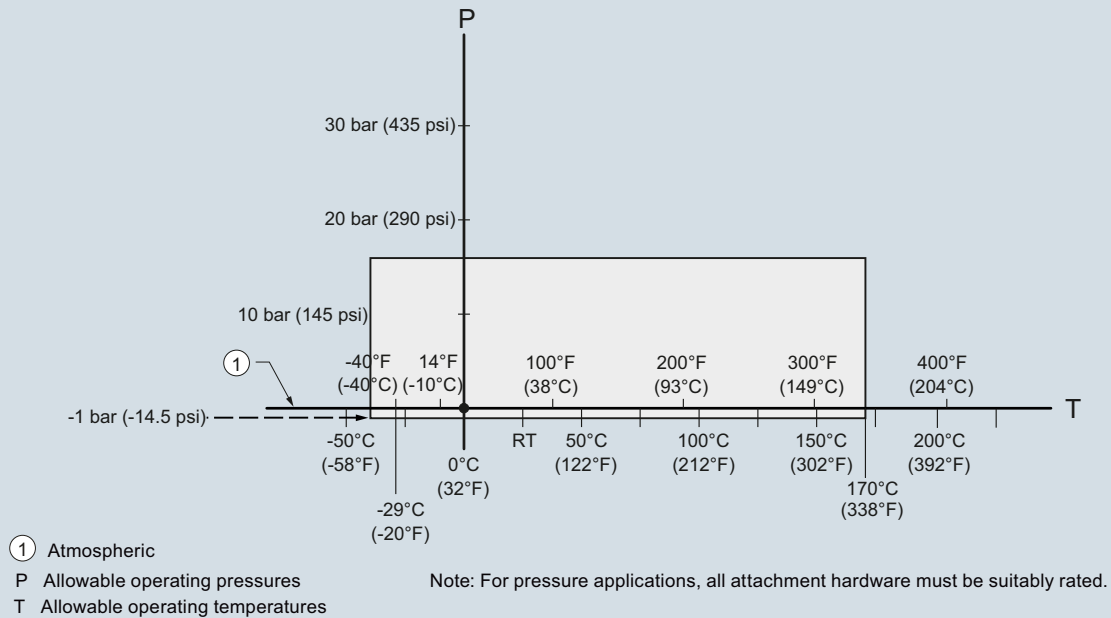
Characteristic curves

DIN 11851 Sanitary/Hygienic nozzle/slotted nut: DN 50, DN 80, and DN 100
 DIN 11864-1 Aseptic/Hygienic nozzle/slotted nut: DN 50, DN 80, and DN 100



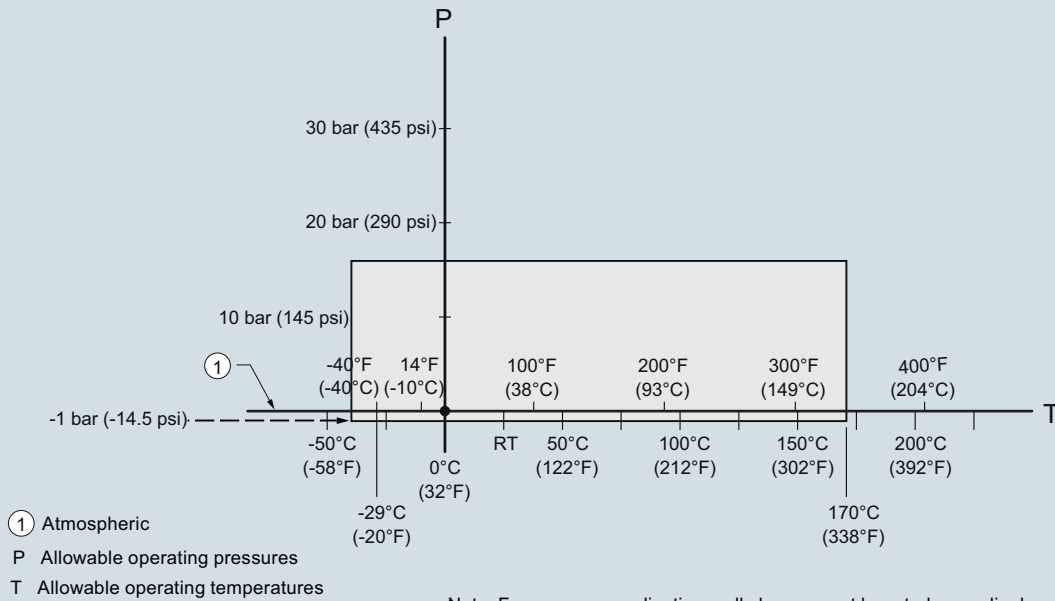
SITRANS LR250 Hygienic Encapsulated Antenna, pressure/temperature curves

DIN 11864-2 Aseptic/Hygienic flanged: DN 50, DN 80, and DN 100



SITRANS LR250 Hygienic Encapsulated Antenna, pressure/temperature curves

DIN 11864-3 Aseptic/Hygienic clamp: DN 50, DN 80, and DN 100
 ISO 2852 Sanitary/Hygienic clamp: 2", 3", and 4"
 Tuohenhagen Varivent face seal clamp: Type N (68 mm) and Type F (50 mm)



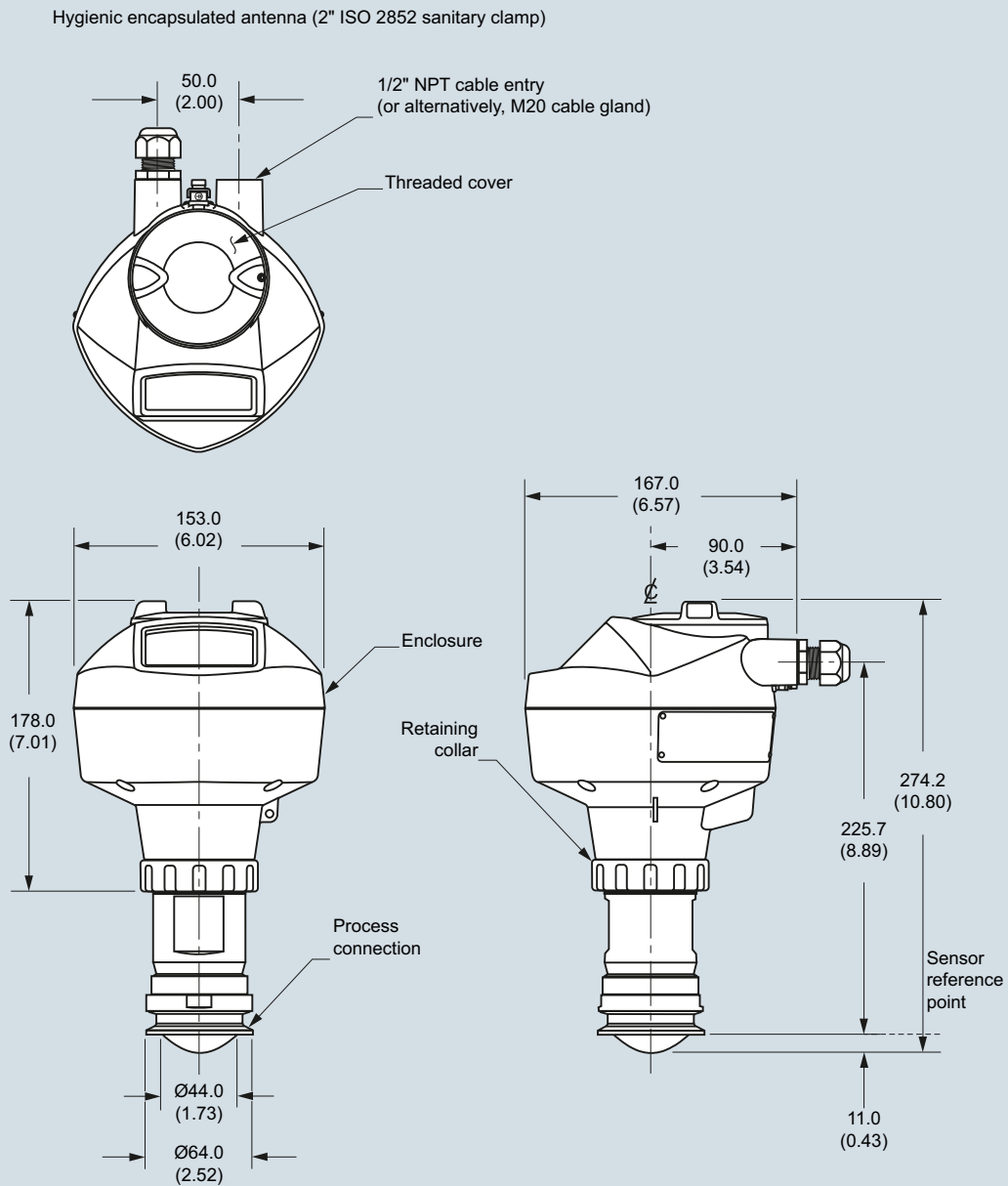
SITRANS LR250 Hygienic Encapsulated Antenna, pressure/temperature curves

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Dimensional drawings



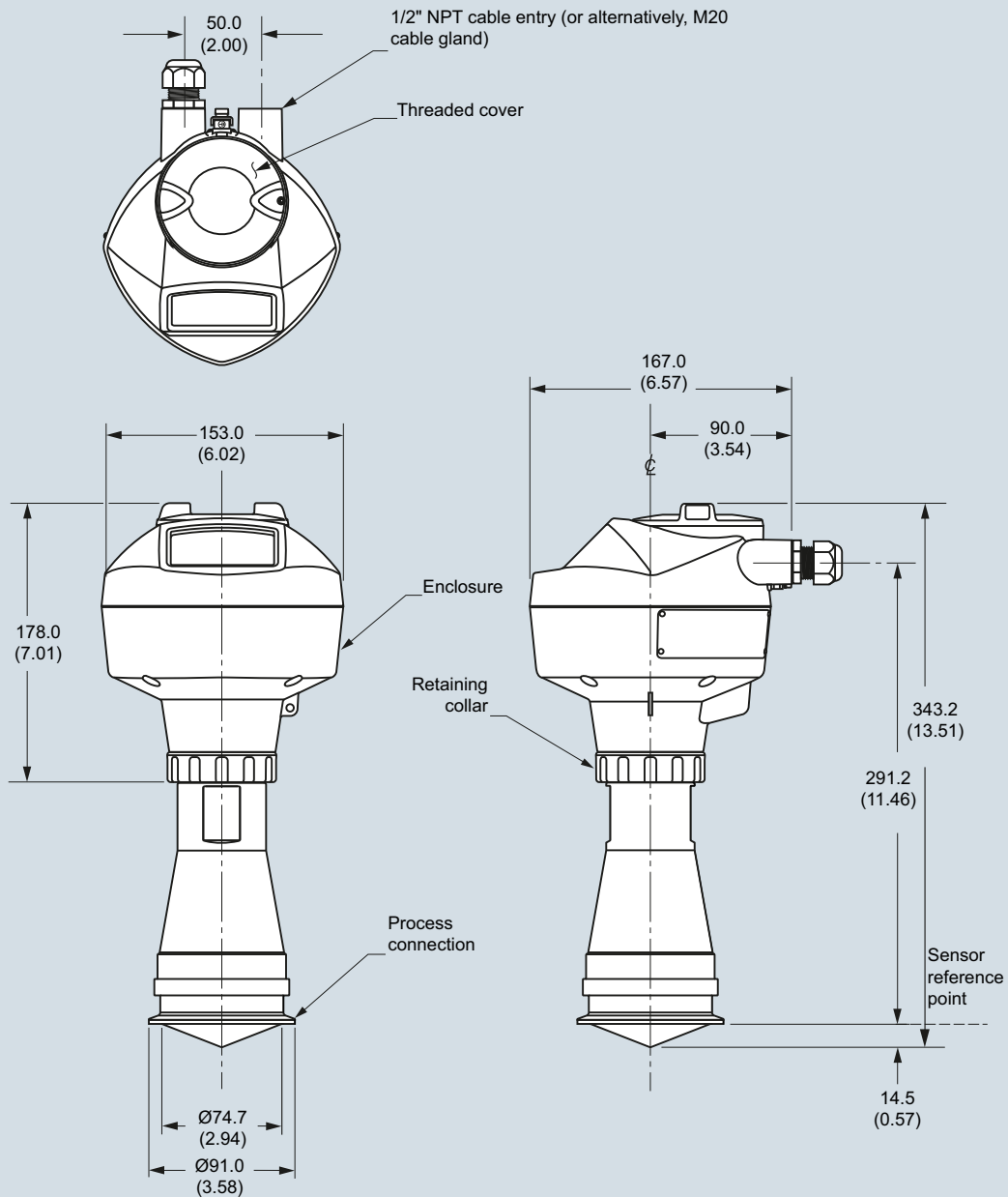
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (3" ISO 2852 sanitary clamp)



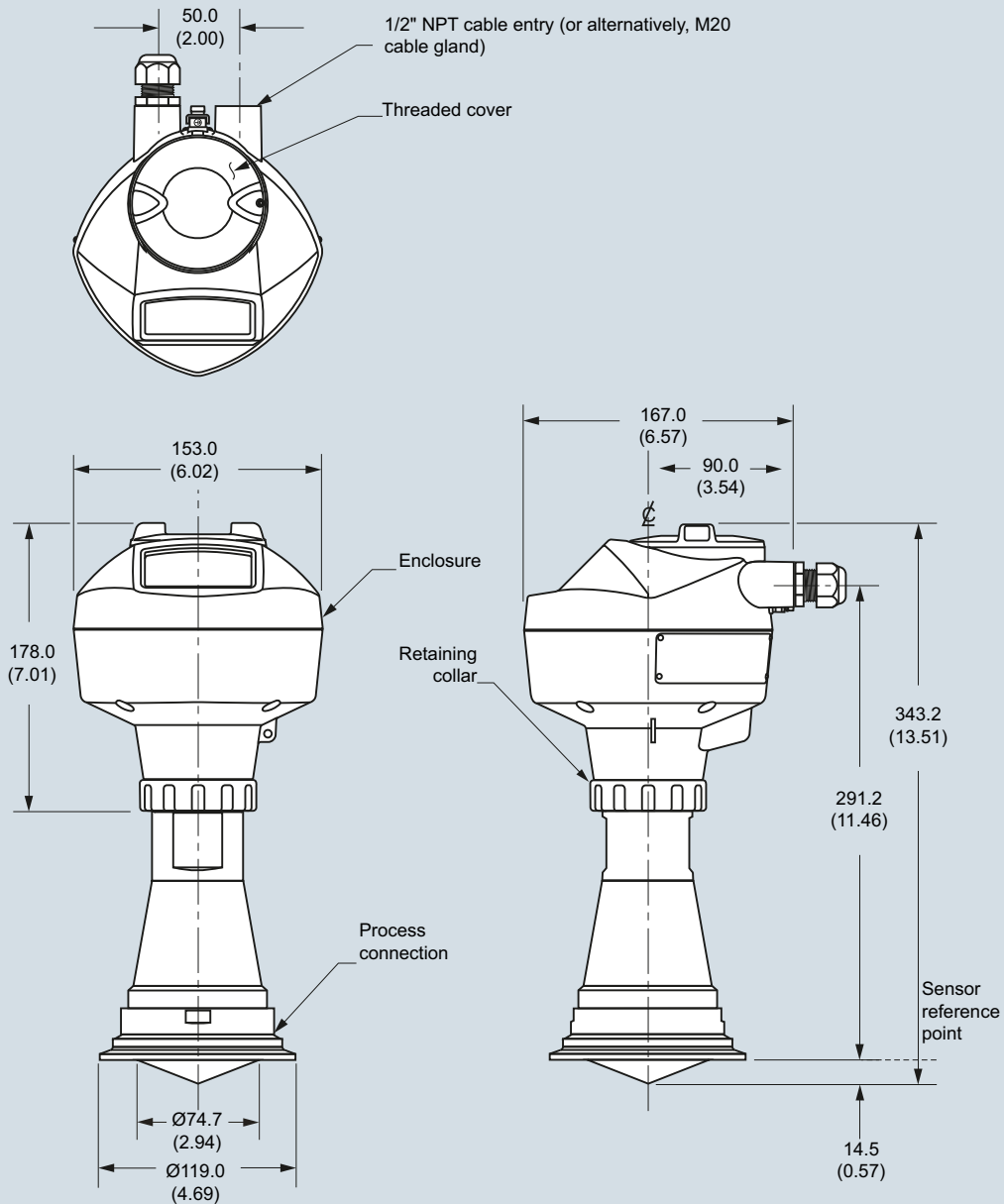
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (4" ISO 2852 sanitary clamp)



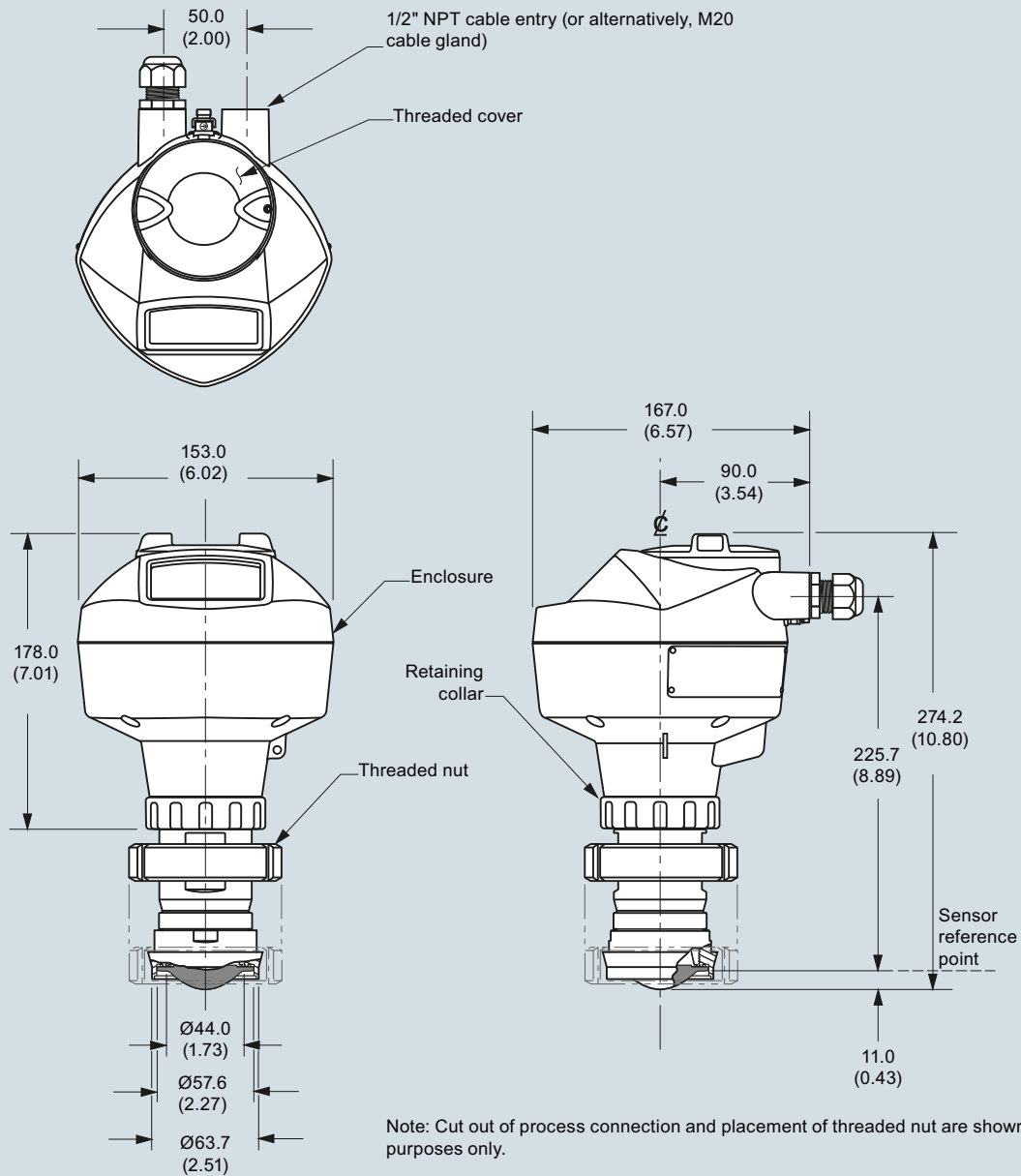
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 50 nozzle/slotted nut to DIN 11851)



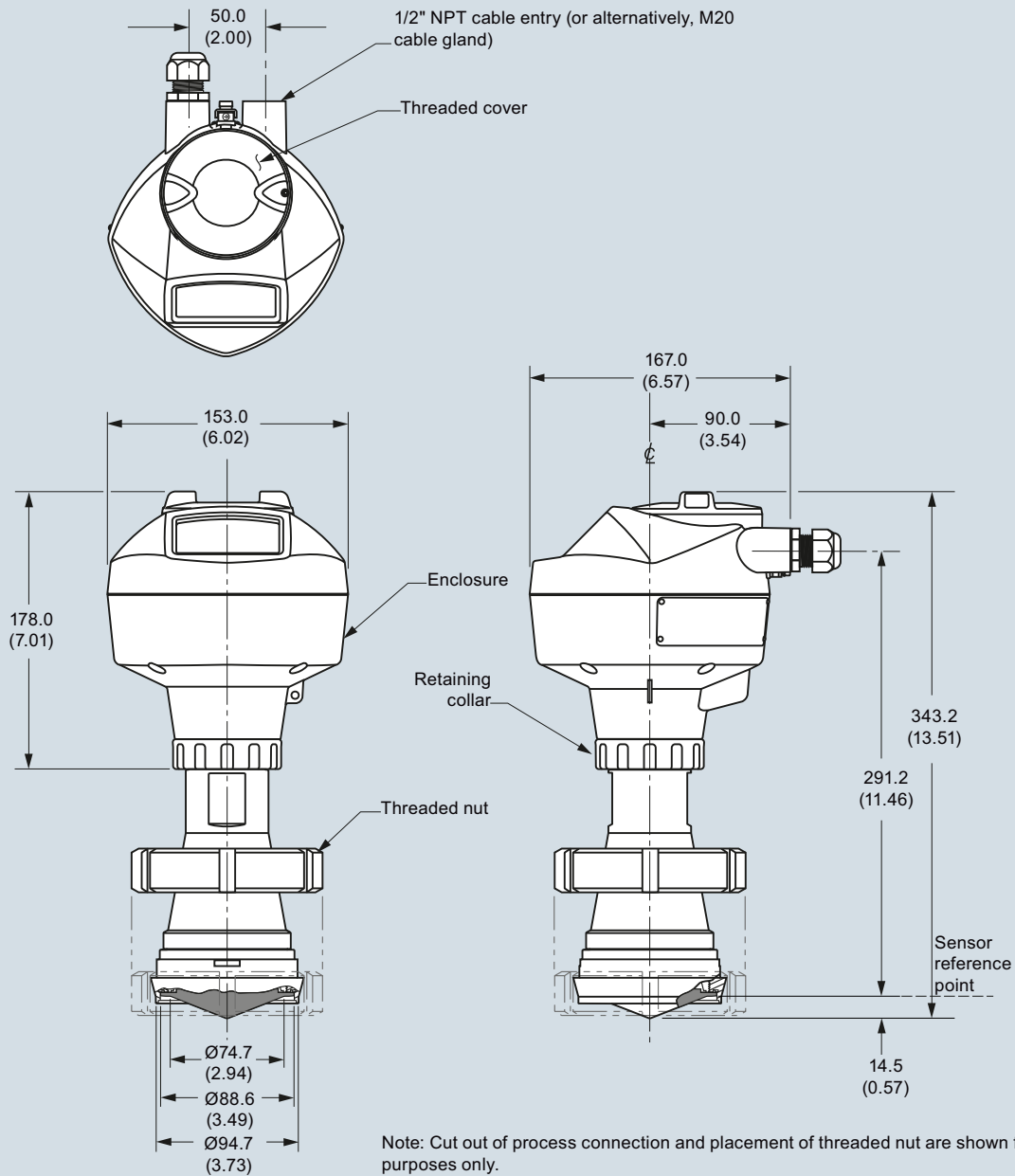
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 80 nozzle/slotted nut to DIN 11851)



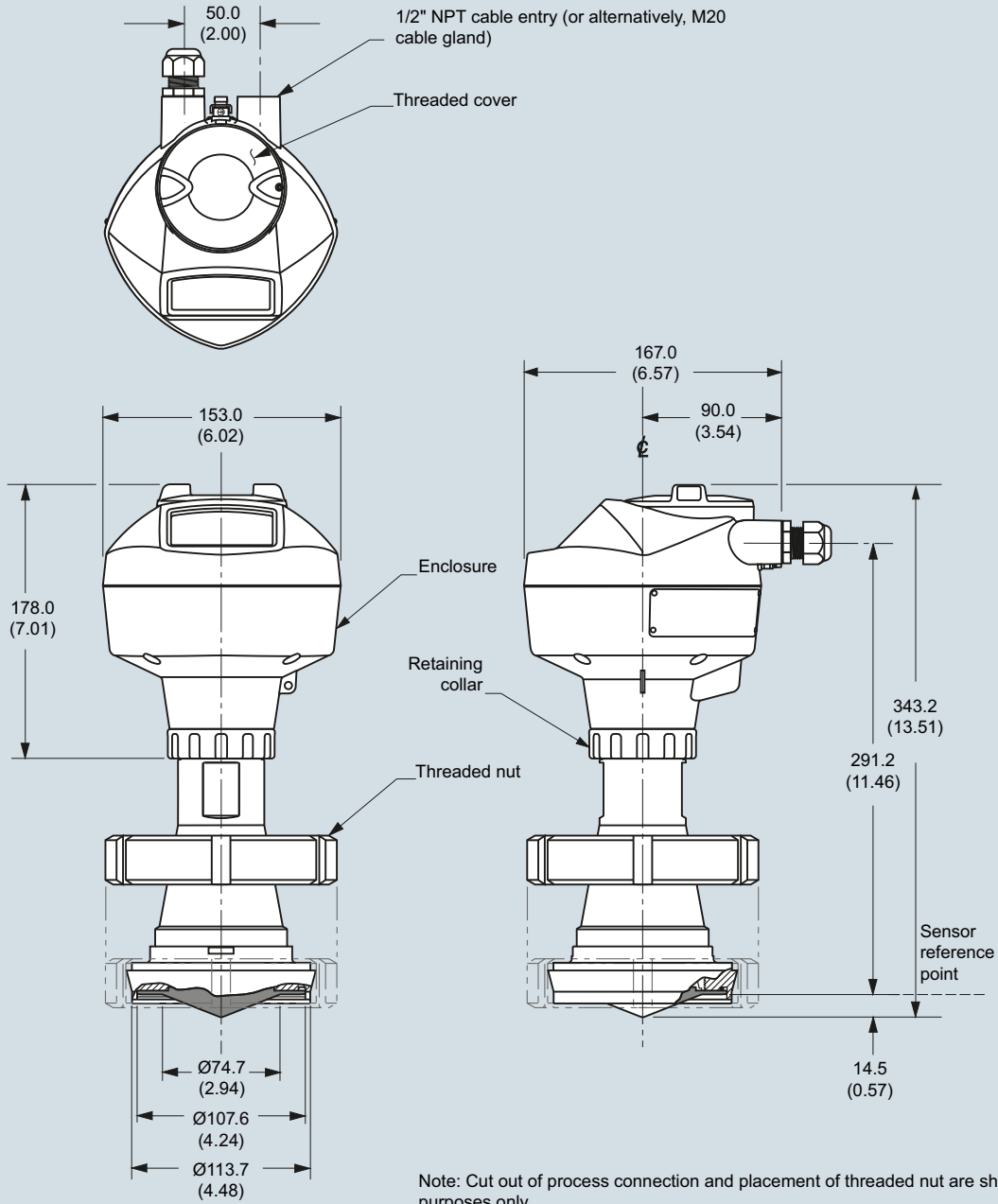
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 100 nozzle/slotted nut to DIN 11851)



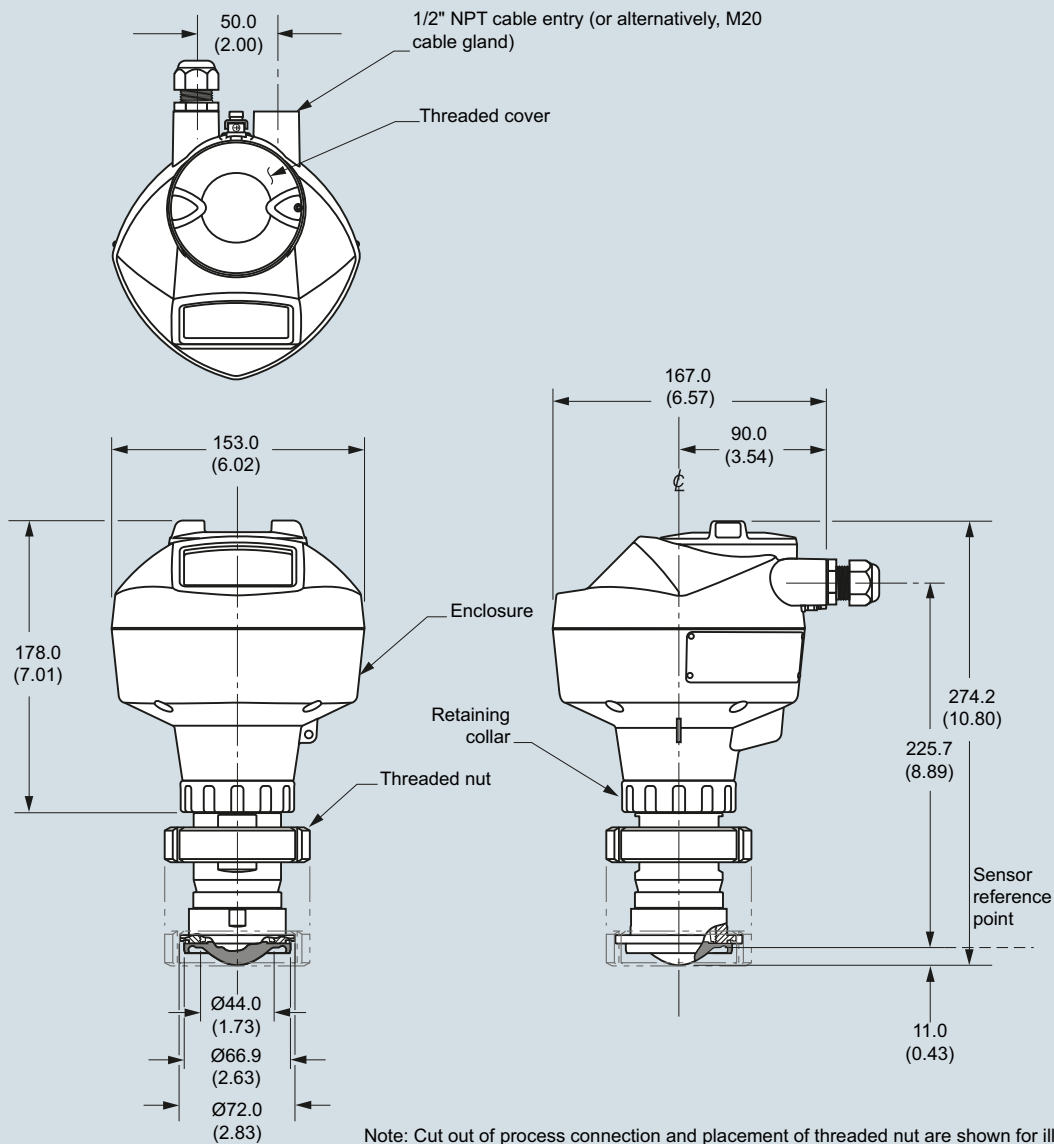
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

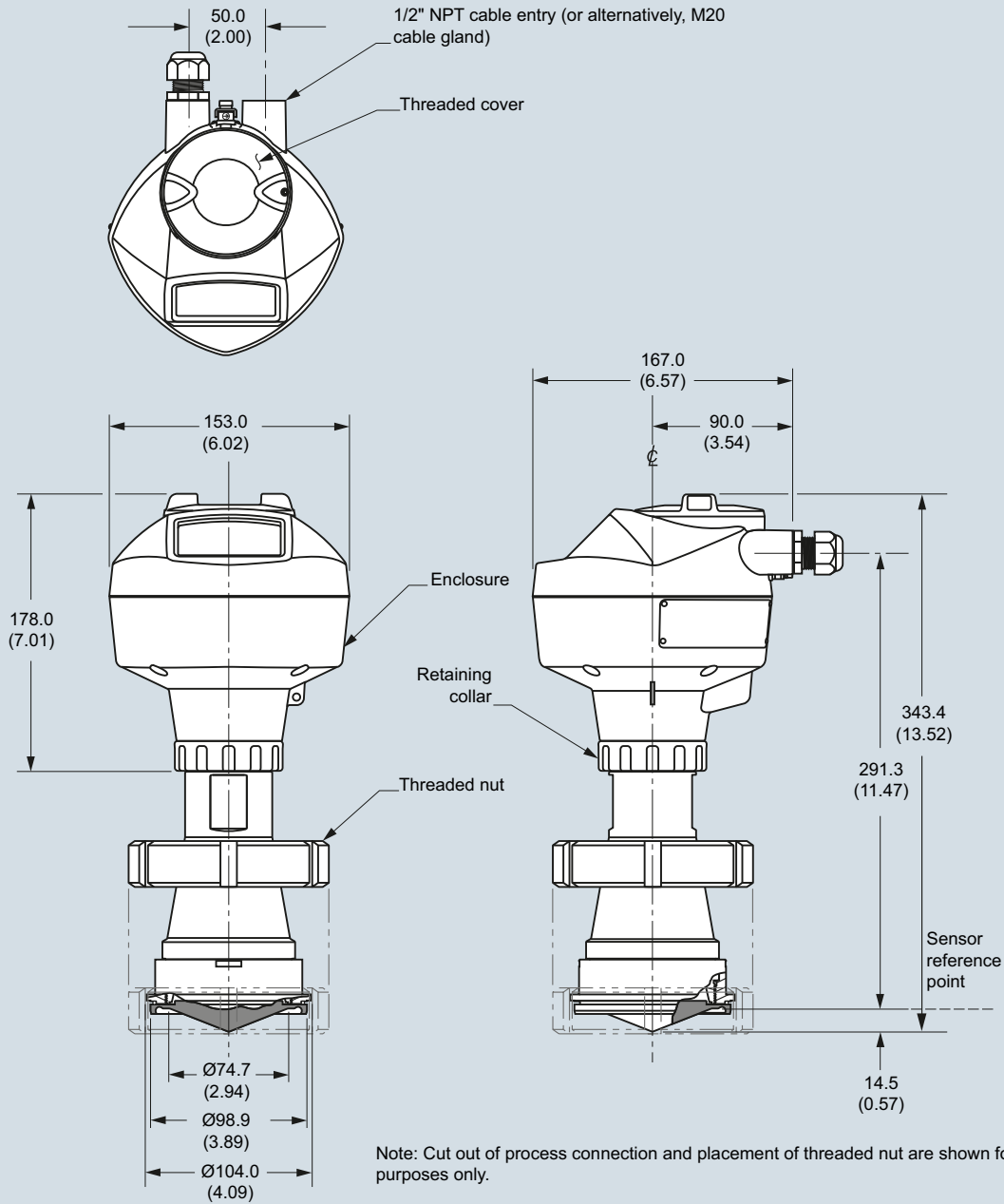
SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 50 aseptic clamp to DIN 11864-1)



SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Hygienic encapsulated antenna (DN 80 aseptic clamp to DIN 11864-1)



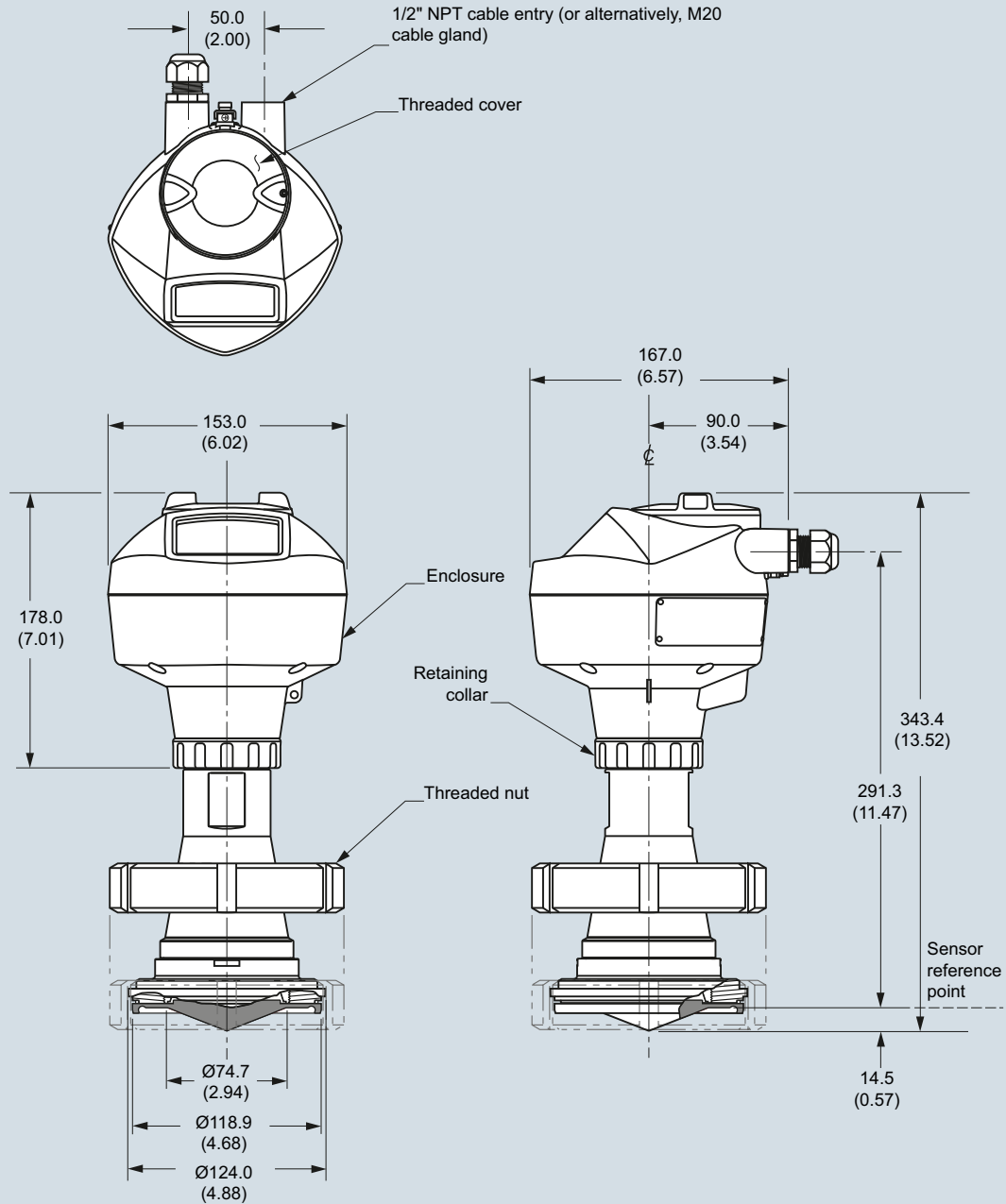
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 100 aseptic clamp to DIN 11864-1)



Note: Cut out of process connection and placement of threaded nut are shown for illustration purposes only.

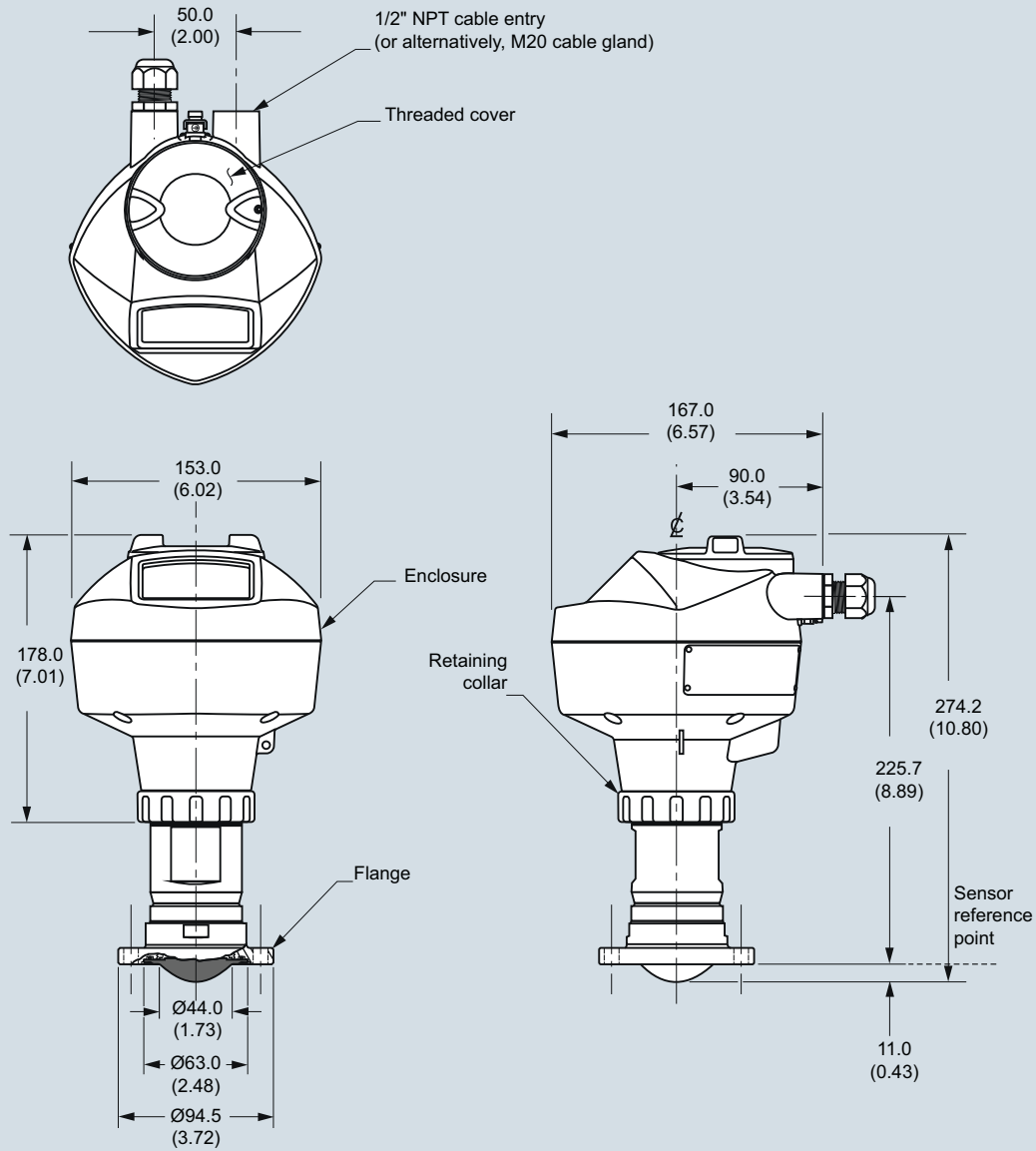
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 50 aseptic flange to DIN 11864-2)



Note: Cut out of process connection and flange are shown for illustration purposes only.

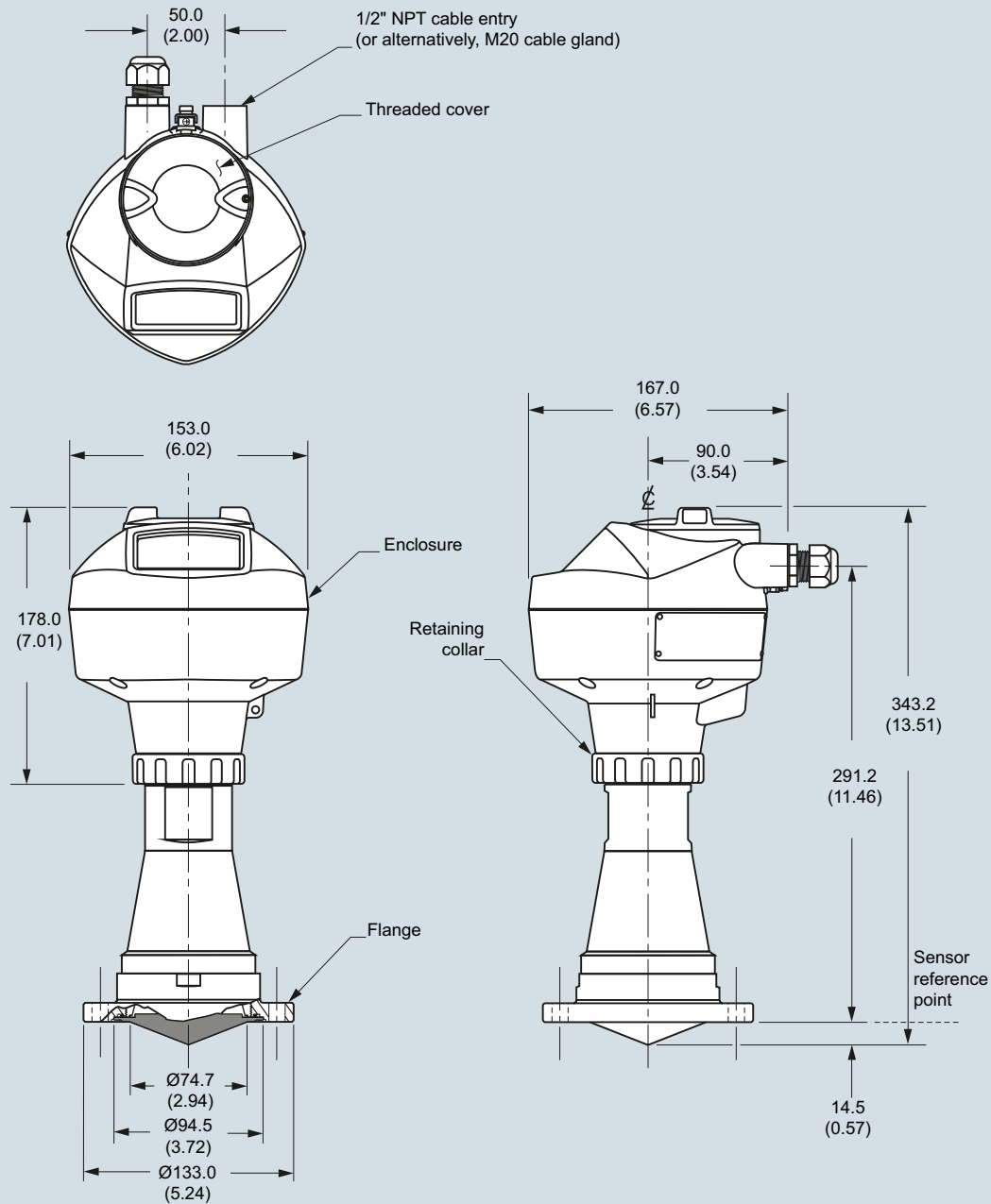
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 80 aseptic flange to DIN 11864-2)



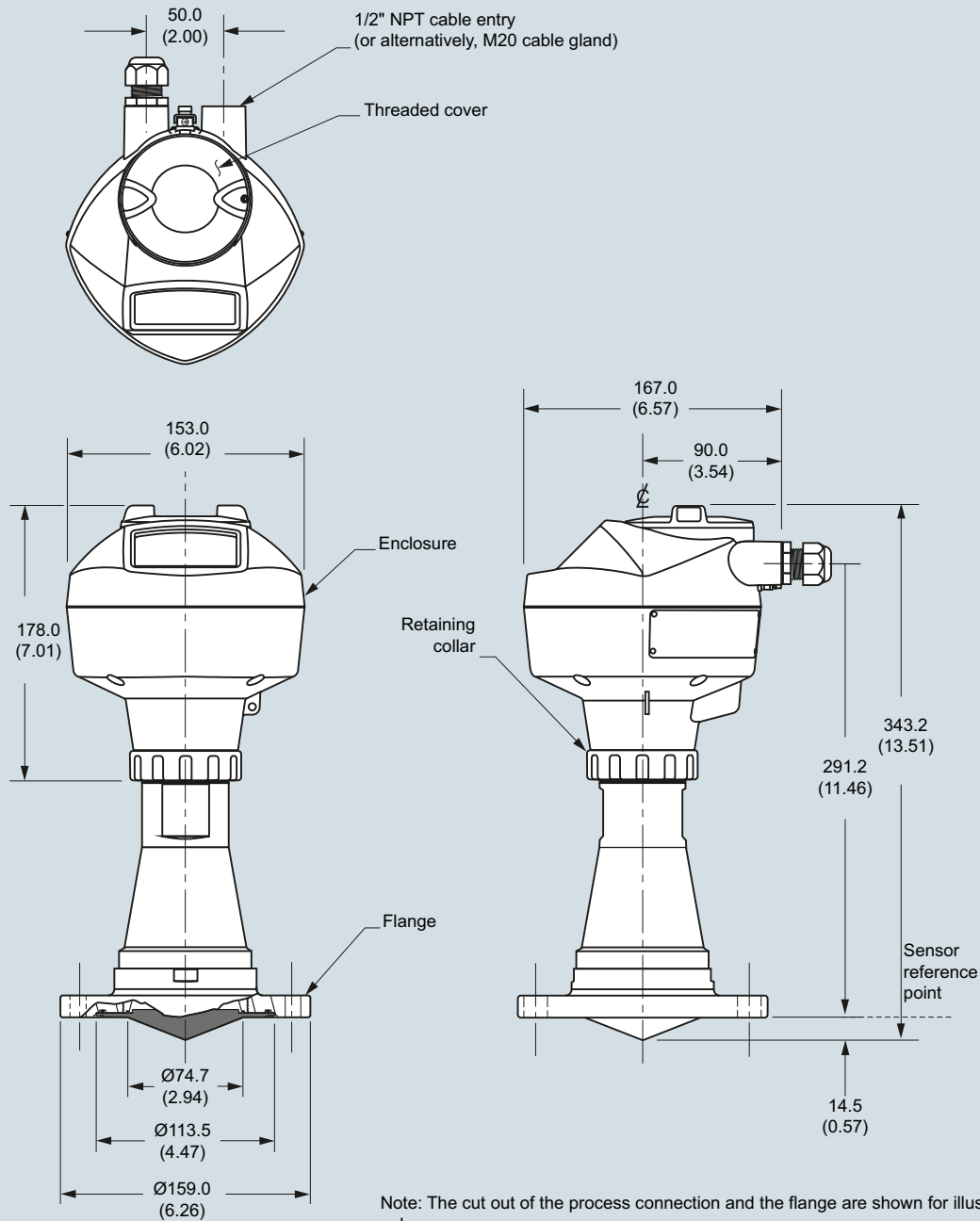
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 100 aseptic flange to DIN 11864-2)



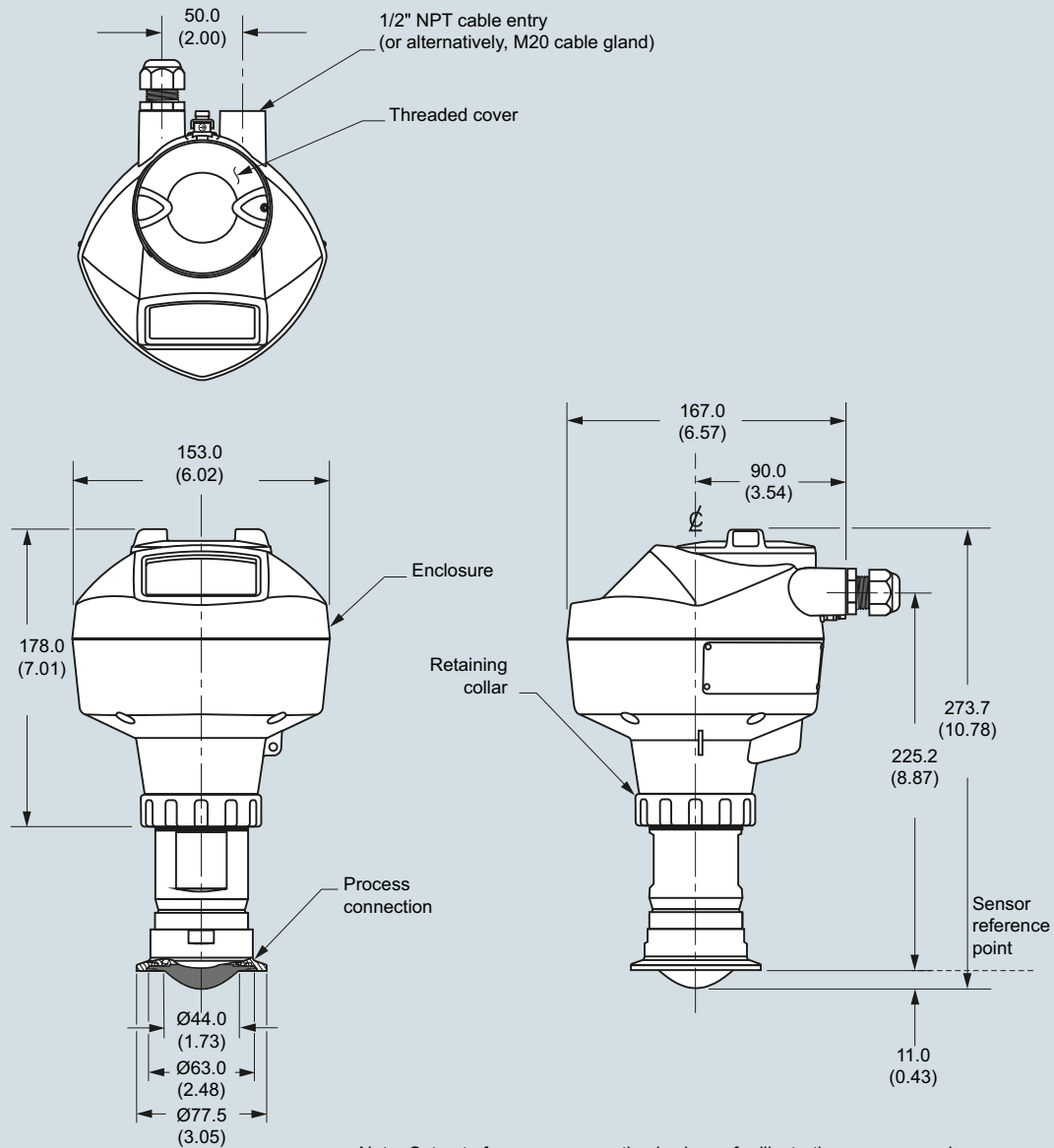
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

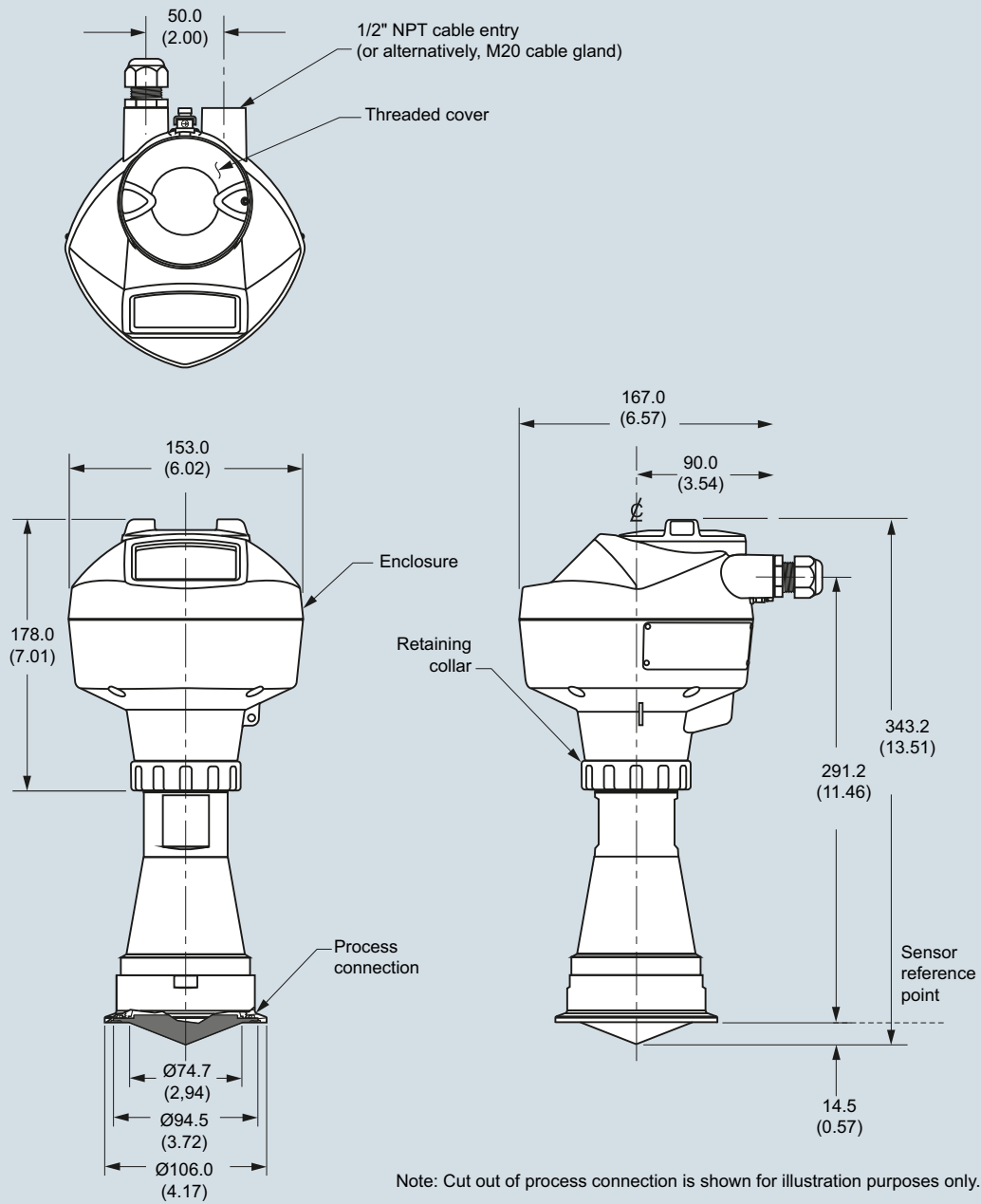
Hygienic encapsulated antenna (DN 50 aseptic clamp to DIN 11864-3)



Note: Cut out of process connection is shown for illustration purposes only.

SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Hygienic encapsulated antenna (DN 80 aseptic clamp to DIN 11864-3)



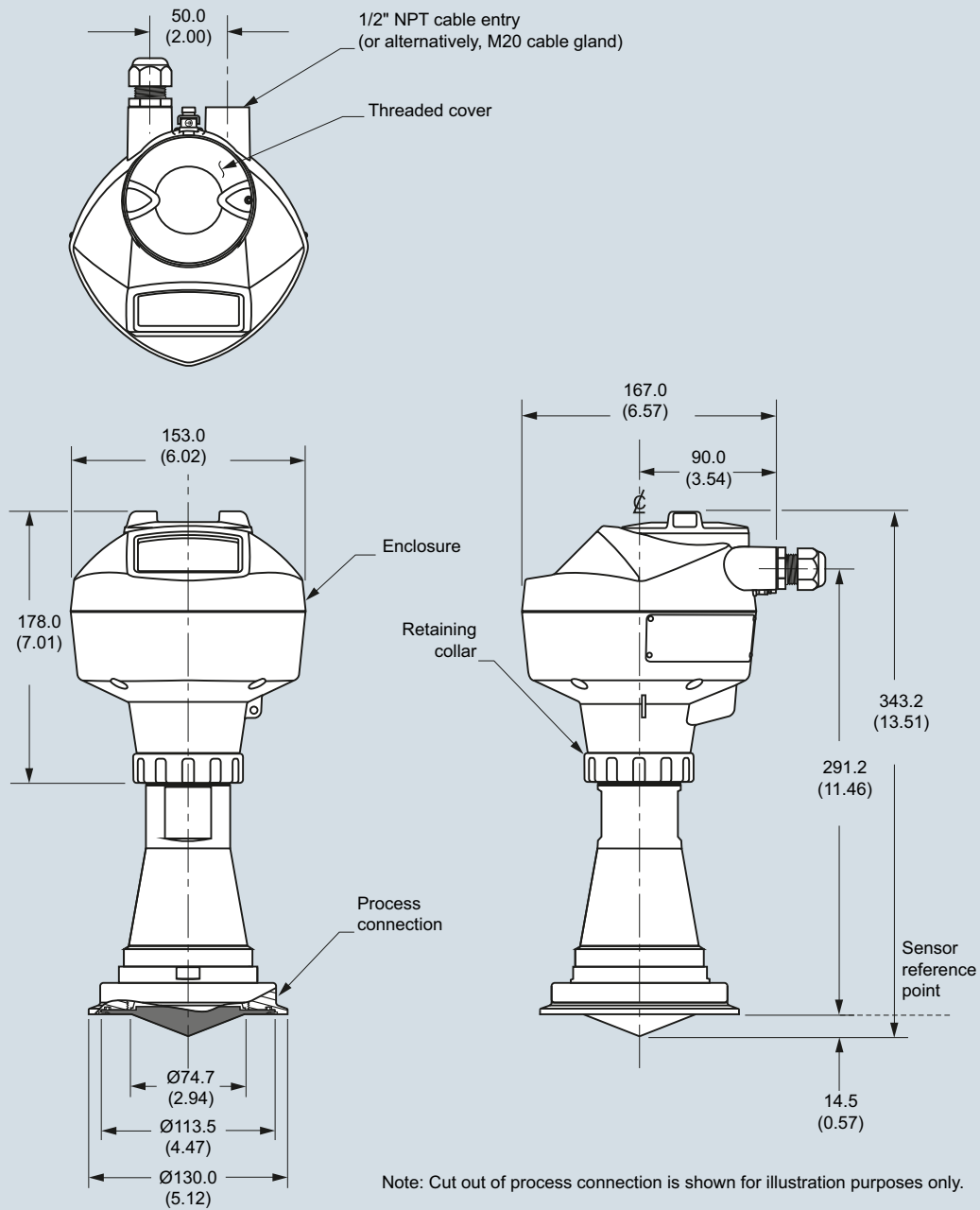
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

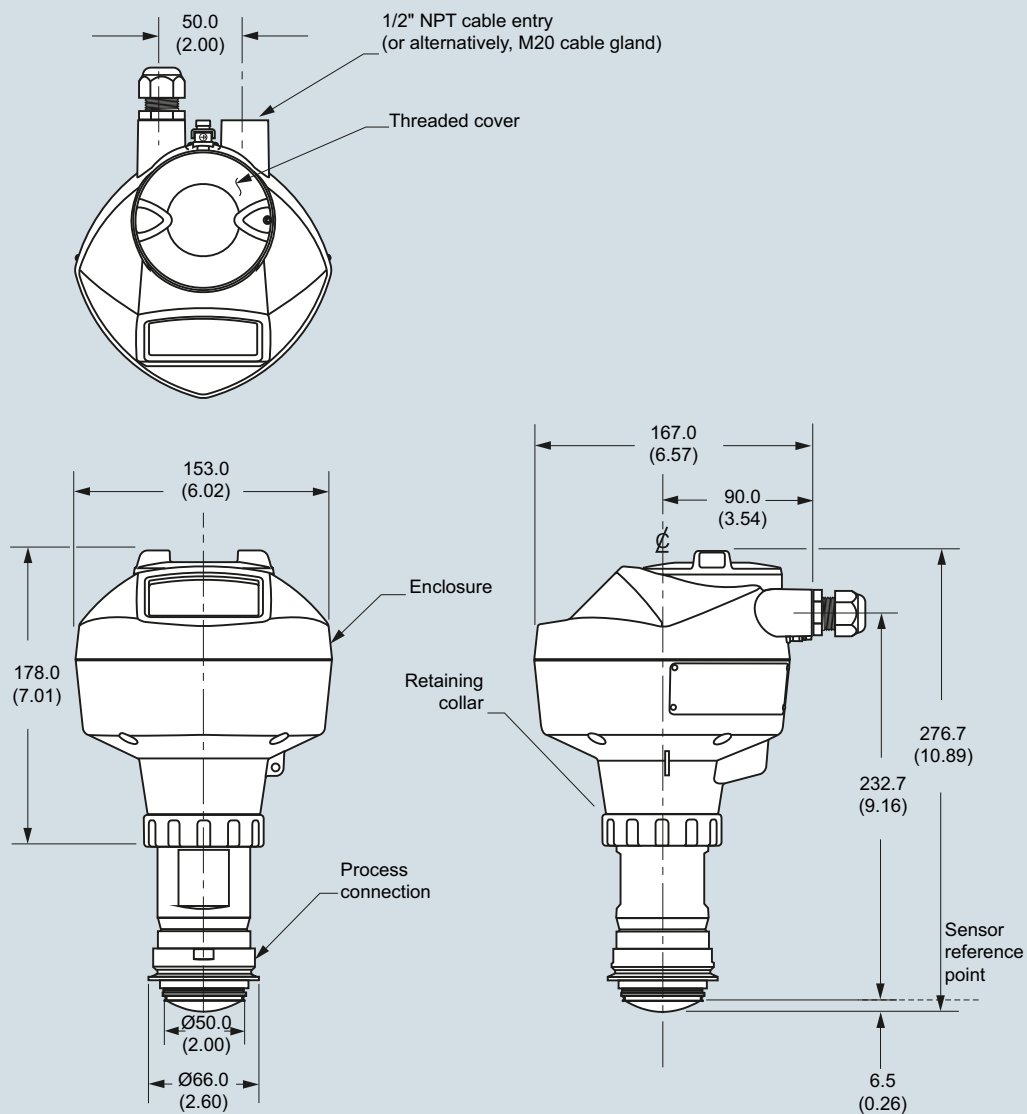
SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (DN 100 aseptic clamp to DIN 11864-3)



SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Hygienic encapsulated antenna (Tuchenhagen Type F, 50 mm)



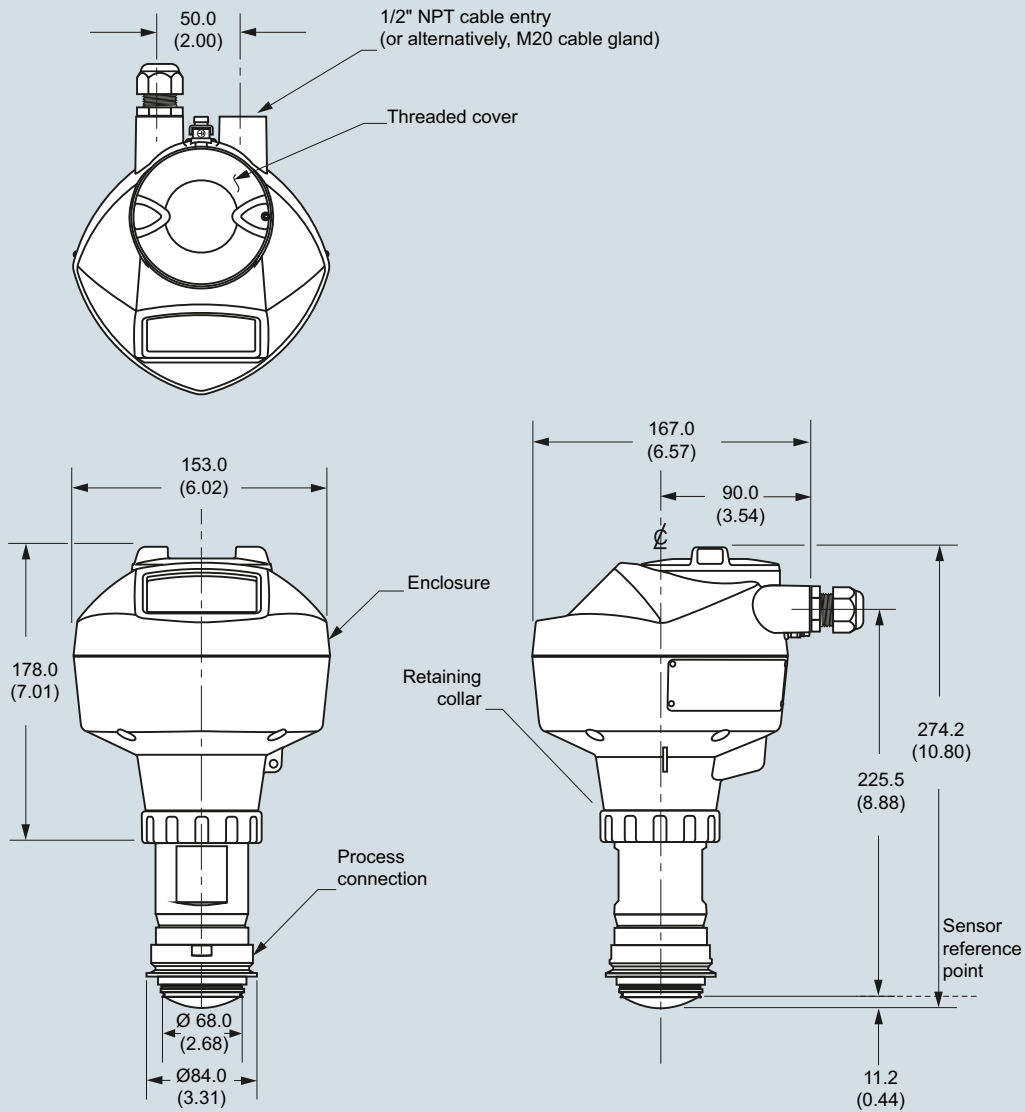
SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Antenna

Hygienic encapsulated antenna (Tuchenhagen Type N, 68 mm)



SITRANS LR250 Hygienic Encapsulated Antenna, dimensions in mm (inch)

Schematics

Connect the wires to the terminals as shown: the polarity is identified on the terminal block.

Shield for HART, PROFIBUS PA, and FOUNDATION Fieldbus Intrinsically Safe versions only.

Hand Programmer

SIEMENS			
1	2	3	4
5	6	7	8
9	0	.	+/−
C	↶	↷	↵
←	↑	↓	→

Part number:
7ML1930-1BK

Notes:

1. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

Gland

SITRANS LR250 connections

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 Hygienic Encapsulated Specials

Selection and ordering data

SITRANS LR250 hygienic encapsulated Specials

	Article No.
For "Electronics Head only" follow the standard configuration and choose YY option on positions 9 and 10 of the full part number.	
For example: 7ML5433-1YY20-1AA0 will order an electronics head for the following:	
EHEDG EL Class 1 approval, 4 ... 20mA HART, M20 cable entries, General purpose Haz Loc approval, pressure rating as per manual.	
Spare Lens Kits (Lens and O-ring)	
Kit, 2 inch, ISO2852, HEA, Lens, silicone secondary O-ring	A5E32572731
Kit, 3 inch, ISO2852, HEA, Lens, silicone secondary O-ring	A5E32572745
Kit, 4 inch, ISO2852, HEA, Lens, silicone secondary O-ring	A5E32572747
Kit, DN 50, DIN11851, HEA, Lens, silicone secondary O-ring	A5E32572758
Kit, DN 80, DIN11851, HEA, Lens, silicone secondary O-ring	A5E32572770
Kit, DN 100, DIN11851, HEA, Lens, silicone secondary O-ring	A5E32572772
Kit, DN 50, DIN11864-1, HEA, Lens, silicone secondary O-ring	A5E32572773
Kit, DN 80, DIN11864-1, HEA, Lens, silicone secondary O-ring	A5E32572779
Kit, DN 100, DIN11864-1, HEA, Lens, silicone secondary O-ring	A5E32572782
Kit, DN 50, DIN11864-2/3, HEA, Lens, silicone secondary O-ring	A5E32572785
Kit, DN 80, DIN11864-2/3, HEA, Lens, silicone secondary O-ring	A5E32572790
Kit, DN 100, DIN11864-2/3, HEA, Lens, silicone secondary O-ring	A5E32572791
Kit, Tuchenhausen, Type F, HEA, Lens, silicone secondary O-ring	A5E32572794
Kit, Tuchenhausen, Type N, HEA, Lens, silicone secondary O-ring	A5E32572795
Accessories (customer side process connection and FKM and EPDM seal for each size and type)	
Kit DN 50 DIN 11864-1 GS Form A tank connection, EPDM Seal Class II	A5E32910638
Kit, DN 80 DIN 11864-1 GS Form A tank connection, EPDM Seal Class II	A5E32910649
Kit, DN 100 DIN 11864-1 GS Form A tank connection, EPDM Seal Class II	A5E32910657
Kit DN 50 DIN 11864-1 GS Form A tank connection, FKM Seal Class I	A5E32910658
Kit, DN 80 DIN 11864-1 GS Form A tank connection, FKM Seal Class I	A5E32910671
Kit, DN 100 DIN 11864-1 GS Form A tank connection, FKM Seal Class I	A5E32910681
Kit 2" ISO 2852 tank connection, Clamp, Cleanable EPDM Seal Class II	A5E32910686

SITRANS LR250 hygienic encapsulated Specials

	Article No.
Kit 3" ISO 2852 tank connection, Clamp, Cleanable EPDM Seal Class II	A5E32910697
Kit 4" ISO 2852 tank connection, Clamp, Cleanable EPDM Seal Class II	A5E32910708
Kit DN 50 DIN 11851 SC tank connection, EPDM Seal Class II ¹¹⁾	A5E32910746
Kit DN 80 DIN 11851 SC tank connection, EPDM Seal Class II ¹¹⁾	A5E32910771
Kit DN 100 DIN 11851 SC tank connection, EPDM Seal Class II ¹¹⁾	A5E32910780
Kit DN 50 DIN 11851 SC tank connection, FKM Seal Class II	A5E32910784
Kit DN 80 DIN 11851 SC tank connection, FKM Seal Class II	A5E32910789
Kit DN 100 DIN 11851 SC tank connection, FKM Seal Class II	A5E32910790
Kit DN 50 DIN 11864-2 Form A tank connection, M8 Hardware (nut/bolt/washer), EPDM Seal Class II	A5E32910791
Kit DN 80 DIN 11864-2 Form A tank connection, M10 Hardware (nut/bolt/washer), EPDM Seal Class II	A5E32910793
Kit DN 100 DIN 11864-2 Form A tank connection, M10 Hardware (nut/bolt/washer), EPDM Seal Class II	A5E32910799
Kit DN 50 DIN 11864-2 Form A tank connection, M8 Hardware (nut/bolt/washer), FKM Seal Class I	A5E32910805
Kit DN 80 DIN 11864-2 Form A tank connection, M10 Hardware (nut/bolt/washer), FKM Seal Class I	A5E32910809
Kit DN 100 DIN 11864-2 Form A tank connection, M10 Hardware (nut/bolt/washer), FKM Seal Class I	A5E32910812
Kit DN 50 DIN 11864-3 Form A tank connection, Clamp, EPDM Seal Class II	A5E32910813
Kit DN 80 DIN 11864-3 Form A tank connection, Clamp, EPDM Seal Class II	A5E32910814
Kit DN 100 DIN 11864-3 Form A tank connection, Clamp, EPDM Seal Class II	A5E32910815
Kit DN 50 DIN 11864-3 Form A tank connection, Clamp, FKM Seal Class I	A5E32910816
Kit DN 80 DIN 11864-3 Form A tank connection, Clamp, FKM Seal Class I	A5E32910817
Kit DN 100 DIN 11864-3 Form A tank connection, Clamp, FKM Seal Class I	A5E32910818
Kit Type F, Tuchenhausen, Clamp, EPDM Seal Class II (EHEDG only) - no tank connection	A5E33489537
Kit Type N, Tuchenhausen, Clamp, EPDM Seal Class II (EHEDG only) - no tank connection	A5E33489543
Kit Type F, Tuchenhausen, Clamp, FKM Seal Class I (EHEDG only) - no tank connection	A5E33489828
Kit Type N, Tuchenhausen, Clamp, FKM Seal Class I (EHEDG only) - no tank connection	A5E33489830

¹¹⁾ Class II for low fat applications when EPDM seal used on DIN 11851.

Overview



SITRANS LR260 is a 2-wire 25 GHz pulse radar level transmitter for continuous monitoring of solids and liquids in storage vessels including extreme levels of dust and high temperatures, to a range of 30 m (98.4 ft).

Benefits

- Graphical local user interface (LUI) makes operation simple with plug-and-play setup using the intuitive Quick Start Wizard
- LUI displays echo profiles for diagnostic support
- 25 GHz high frequency allows for small horn antennas mounted easily in nozzles
- Communication using HART or PROFIBUS PA
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or SIMATIC PDM

Application

SITRANS LR260 includes a graphical local user interface (LUI) that improves setup and operation using an intuitive Quick Start Wizard, and echo profile displays for diagnostic support. Start-up is easy using the Quick Start wizard with a few parameters required for basic operation.

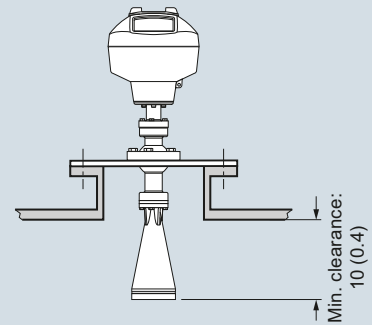
SITRANS LR260's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid.

SITRANS LR260 measures virtually any solids material to a range of 30 m (98.4 ft).

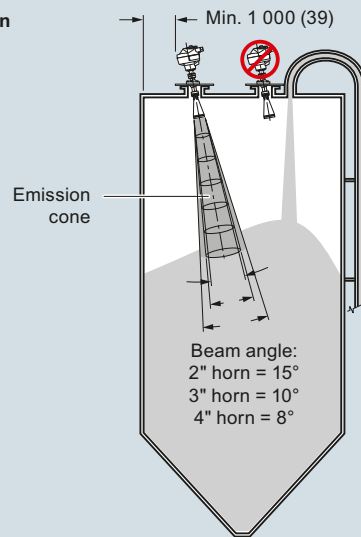
- Key Applications: cement powder, plastic powder/pellets, grain, flour, coal, solids and liquids bulk storage vessels, and other applications.

Configuration

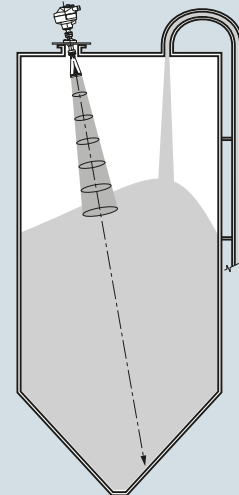
Mounting on a nozzle



Installation



Positioning with easy Aimer



SITRANS LR260 installation, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR260

Technical specifications

Mode of operation		Design	
Measuring principle	Pulse radar level measurement	Enclosure	Aluminum, polyester powder-coated
Frequency	K-band (25.0 GHz)	• Construction	2 x M20x1.5 or 2 x 1/2" NPT
Minimum detectable distance	0.05 m (2 inch) from end of horn	• Conduit entry	Type 4X/NEMA 4X, Type 6/ NEMA 6, IP67, IP68
Maximum measuring range ¹⁾		Degree of protection	< 8.14 kg (17.9 lb) including 4" flange and standard Easy Aimer with 4" horn antenna
• Solids	<ul style="list-style-type: none"> • 2" horn: 10 m (32.8 ft) • 3" horn: 20 m (65.6 ft) • 4" horn: 30 m (98.4 ft) 	Weight	Graphic LCD, with bar graph representing level
• Liquids	<ul style="list-style-type: none"> • 2" horn: 20 m (65.6 ft) • 3" horn: 30 m (98.4 ft) • 4" horn: 30 m (98.4 ft) 	Display (local)	Flange and horn (easy aimer model)
Output - HART		• Material	304 stainless steel
Power	• 4 ... 20 mA (\pm 0.02 mA accuracy)	• Horn antenna	2" horn
Fail signal	• Nominal 24 V DC (max. 30 V DC)		3" horn
Load	• 3.6 mA ... 23 mA; or last value 230 ... 600 Ω		4" horn
Output - PROFIBUS PA		Process connections	
	<ul style="list-style-type: none"> • Per IEC 61158-2 • 15.0 mA • Profile version 3.01, Class B 	• Universal flanges ²⁾	2 inch/50 mm, 3 inch/80 mm, 4 inch/100 mm, 6 inch/150 mm
Performance (according to reference conditions IEC60770-1)		Mechanical (Threaded Connection model)	
Maximum measured error (including hysteresis and non-repeatability)	<ul style="list-style-type: none"> • 25 mm (1 inch) from minimum detectable distance to 300 mm (11.8 inch) • Remainder of range = 10 mm (0.39 inch) or 0.1 % of spa(whichever is greater) 	• Threaded connection	2" NPT (ASME B1.20.1), R (BSPT, EN 10226-1) or G (BSP, EN ISO 228-1) 316L/1.4404 or 316L/1.4435 stainless steel PTFE emitter
		• Materials	
Rated operating conditions		Certificates and approvals	
Installation conditions		General	CSA _{US/C} , CE, FM
• Location	Indoor/outdoor	Radio	Europe (R&TTE), FCC, Industry Canada, RCM
Ambient conditions (enclosure)		Hazardous	CSA/FM Class II, Div. 1, Groups E, F, G, Class III ATEX II 1D, 1/2D, 2D Ex ta IIIC T100 °C Da IECEx/ATEX II 1 GD Ex ia IIC T4 Ga, Ex ta IIIC T100 °C Da CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G SABS ARP0108 Ex ia IIC T4 Ga
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)		
• Installation category	I		
• Pollution degree	4		
Medium conditions		Programming	
Dielectric constant ϵ_r	$\epsilon_r > 1.6$, antenna and application dependent	Intrinsically Safe Siemens handheld programmer	Infrared receiver IS model:
Process temperature	-40 ... +200 °C (-40 ... +392 °F)	• Approvals for handheld programmer	ATEX II 1GD Ex ia IIC T4 Ga Ex iaD 20 T135 °C Ta = -20 ... +50 °C CSA/FM Class I, II, and III, Div. 1, Groups A, B, C, D, E, F, G, T6 Ta = 50 °C
Process pressure	<ul style="list-style-type: none"> • 0.5 bar g (7.25 psi g) maximum • 3 bar g (43.5 psi g) optional with 80 °C (176 °F) temperature max 		
		Handheld communicator	HART communicator 375
		PC	SIMATIC PDM
		Display (local)	Graphic local user interface including quick start wizard and echo profile displays

¹⁾ From sensor reference point

²⁾ Universal flange mates with EN 1092-1 (PN 16)/ASME B16.5 (150 lb)/JIS 2220 (10K) bolt hole pattern

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LR260 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of solids to a range of 30 m (98.4 ft).	7ML5427- 0 0 0 -	Further designs Please add "-Z" to Article No. and specify Order code(s).	
Order handheld programmer separately ➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	Y15
Process connection Universal flat faced flange fits ANSI/DIN/JIS flanges, Easy Aimer with integral (Easy Aimer ball)		Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204 ⁴⁾	C11 C12
2 inch/50 mm	A	Operating Instructions for HART/mA device	Article No.
3 inch/80 mm	B	English	7ML1998-5KE03
4 inch/100 mm	C	German	A5E34942821
6 inch/150 mm	D	Note: The Operating Instructions should be ordered as a separate line item on the order. Multi-language Quick Start manual	A5E32106122
Threaded connection		This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
2" NPT (ASME B1.20.1) (tapered thread) ¹⁾²⁾⁵⁾	E	Operating Instructions for PROFIBUS PA device	Article No.
R 2" [(BSPT), EN 10226-1] (tapered thread) ¹⁾²⁾⁵⁾	F	English	7ML1998-5KF03
G 2" [(BSPT), EN ISO 228-1] (parallel thread) ¹⁾²⁾⁵⁾	G	German	A5E34957877
		Note: The Operating Instructions should be ordered as a separate line item on the order. Multi-language Quick Start manual	A5E32114443
		This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
Antenna		Accessories	
2" Horn antenna, fits 50 mm or 2" nozzles ¹⁾	A	One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART	7ML1930-1AP
2" Horn antenna with 100 mm extension ¹⁾	B	One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA	7ML1930-1AQ
2" Horn antenna with 200 mm extension ¹⁾	C	Handheld programmer, Infrared, Intrinsically Safe	7ML1930-1BK
2" Horn antenna with 500 mm extension ¹⁾²⁾	D	Dust cap, PTFE, for 2 inch/50 mm horn	7ML1930-1DE
2" Horn antenna with 1 000 mm extension ¹⁾²⁾	E	Dust cap, PTFE, for 3 inch/75 mm horn	7ML1930-1BL
3" Horn antenna, fits 80 mm or 3" nozzles ³⁾	F	Dust cap, PTFE, for 4 inch/100 mm horn	7ML1930-1BM
3" Horn antenna with 100 mm extension ³⁾	G	HART modem/USB (for use with a PC and SIMATIC PDM)	7MF4997-1DB
3" Horn antenna with 200 mm extension ³⁾	H	SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
3" Horn antenna with 500 mm extension ²⁾³⁾	J	SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
3" Horn antenna with 1 000 mm extension ²⁾³⁾	K	SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
4" Horn antenna, fits 100 mm or 4" nozzles	L	SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
4" Horn antenna with 100 mm extension	M	For applicable back up point level switch - see point level measurement section	
4" Horn antenna with 200 mm extension	N	Note: Products shipped with plastic cable gland, rated to -20 °C. If -40 °C rating required, then metallic cable gland is recommended.	
4" Horn antenna with 500 mm extension ²⁾	P		
4" Horn antenna with 1 000 mm extension ²⁾	Q		
Purge (self cleaning) connection			
No purge connection	0		
Purge connection	1		
Output/communication			
4 ... 20 mA, HART	0		
PROFIBUS PA	1		
Cable inlet			
2 x M20x1.5	A		
2 x 1/2" NPT	B		
Note: Polymeric cable glands will be provided with M20 devices.			
Approvals			
General purpose, CSA _{US/CA} , FM, Industry Canada, FCC, CE, R&TTE, RCM	A		
CSA/FM Class II, Div. I, Groups E, F, G, Class III, Industry Canada, FCC, RCM	B		
ATEX II 1D, 1/2D, 2D Ex ta IIIC T100 °C Da, CE, R&TTE, RCM, INMETRO	C		
Non-incendive, CSA/FM Class I, Div. 2, Groups A, B, C, D, Industry Canada, FCC, RCM	D		
Intrinsically safe, IECEx/ATEX II 1 GD Ex ia IIC T4 Ga, Ex ta IIIC T100 °C Da, R&TTE, RCM	E		
Intrinsically safe, CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, Industry Canada, FCC, RCM	F		
Intrinsically safe, South Africa ARP0108 Ex ia IIC T4 Ga	G		
Pressure rating			
Rating per Pressure/Temperature curves in manual ⁶⁾	0		
0.5 bar g (7.25 psi g) maximum	1		

1) Maximum measurement range 10 m (32.8 ft) solids or 20m (65.6ft) liquids

2) Available with Purge option 0 only

3) Maximum measurement range 20 m (65.6 ft) solids or 30m (98.4ft) liquids

4) Available with pressure option 0 only

5) Available with Antenna Options A, B, F, G, L, and M only

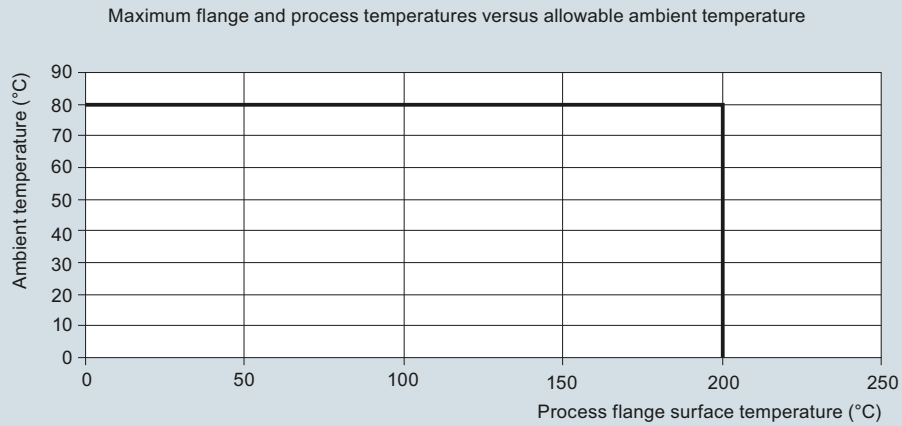
6) Available with pressure option 0 only

Level Measurement

Continuous level measurement – Radar transmitters

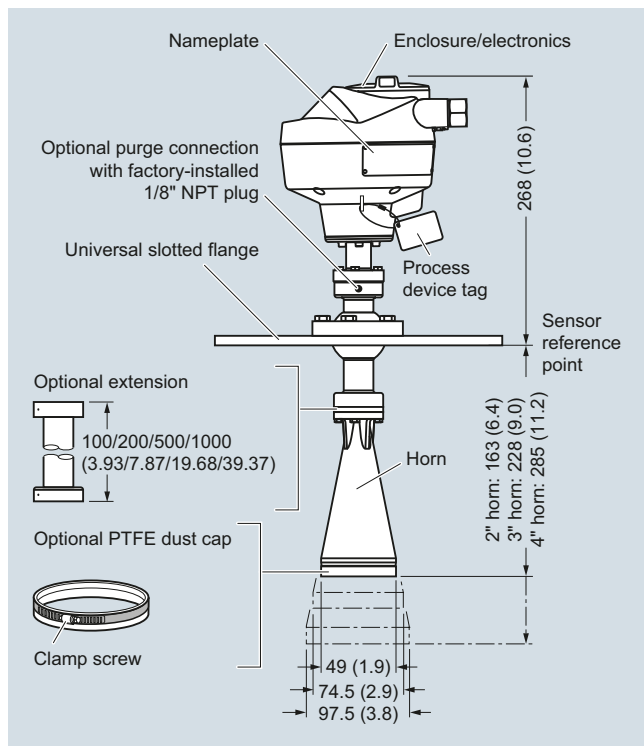
SITRANS LR260

Characteristic curves



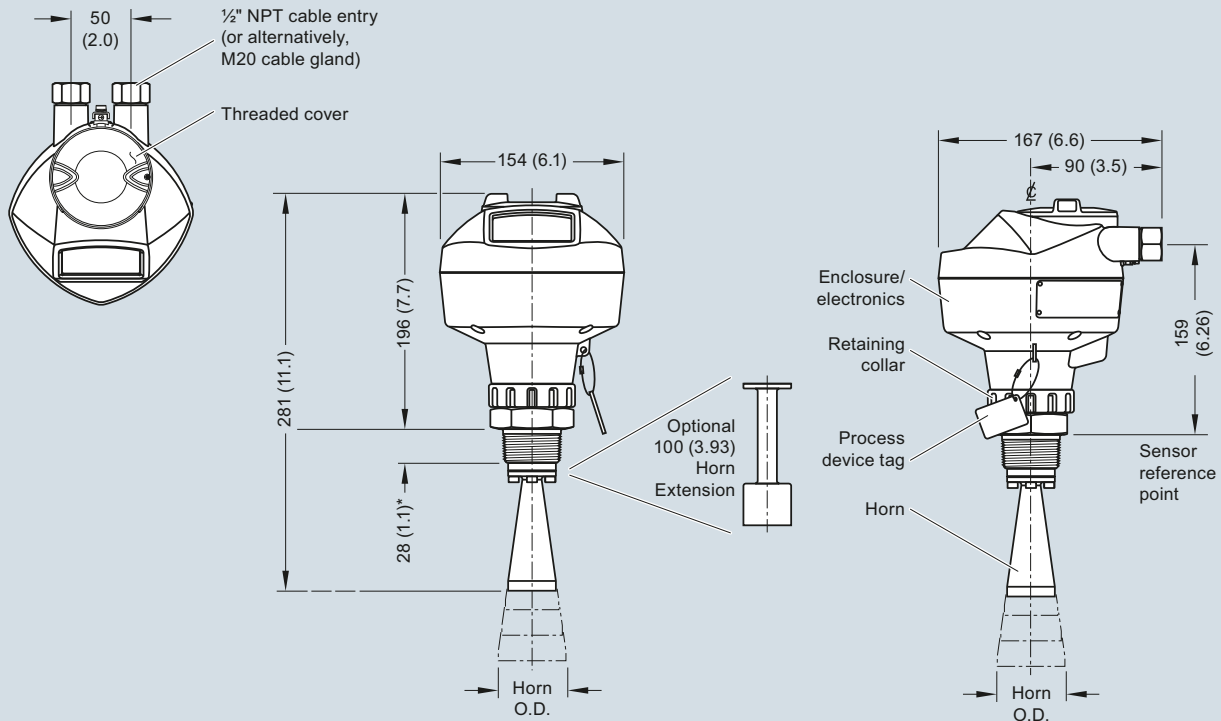
SITRANS LR260 Ambient/Process Flange Surface Temperature Curve

Dimensional drawings



SITRANS LR260, dimensions in mm (inch)

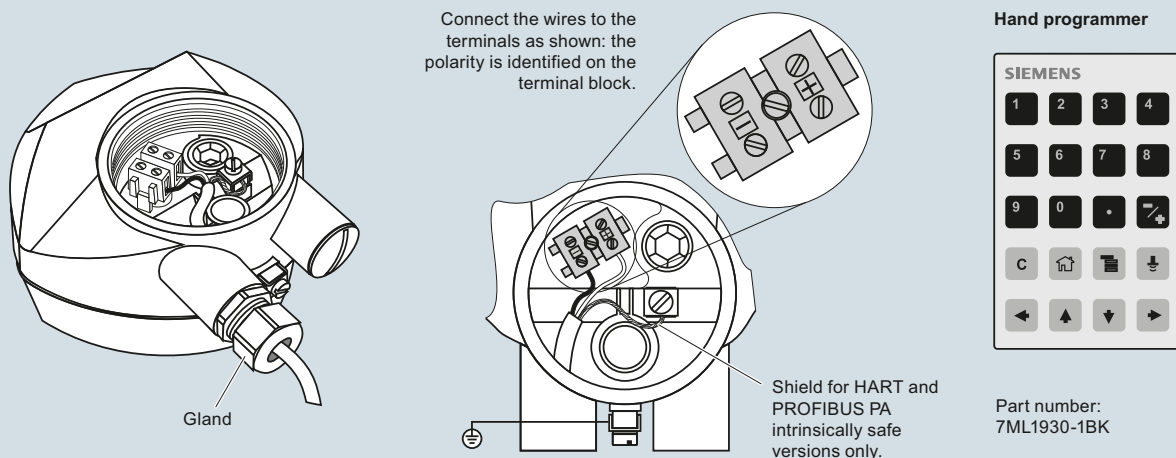
SITRANS LR260



Antenna Type	Antenna O.D.	Height to sensor reference point			Beam angle	Measurement range
		1-1/2" threaded connection	2" threaded connection	3" threaded connection		
2" horn	47.8 (1.88)	N/A	166 (6.55)	180 (7.09)	15 degrees	20 m (65.6 ft)
3" horn	74.8 (2.94)	N/A	199 (7.85)	213 (8.39)	10 degrees	20 m (65.6 ft)
4" horn	94.8 (3.73)	N/A	254 (10)	268 (10.55)	8 degrees	20 m (65.6 ft)

SITRANS LR260, dimensions in mm (inch)

Schematics



Notes:

1. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

SITRANS LR260 connections

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR460

Overview



The SITRANS LR460 is a 4-wire, 24 GHz FMCW radar level transmitter with extremely high signal-to-noise ratio and advanced signal processing for continuous monitoring of solids up to 100 m (328 ft). It is ideal for measurement in extreme dust.

Benefits

- Process Intelligence for advanced signal processing and quick and easy adjustment
- Self-guided quick start wizard for plug and play start-up
- 24 GHz provides superior reflective properties on solids surfaces
- 100 m (328 ft) range for long-range and difficult applications
- Easy Aimer optimizes signal quality on sloped surfaces
- Programming using infrared Intrinsically Safe handheld programmer or with SIMATIC PDM or HART handheld device

Application

SITRANS LR460 provides excellent results even during conditions of extreme dust. The integral Easy Aimer included on the SITRANS LR460 allows for easy positioning for optimum measurement on solids.

Process Intelligence onboard SITRANS LR460 means advanced signal processing is harnessed for reliable operation on both simple and difficult solids application.

SITRANS LR460 features a robust enclosure, flange and horn components. It is virtually unaffected by atmospheric or temperature conditions within the vessel.

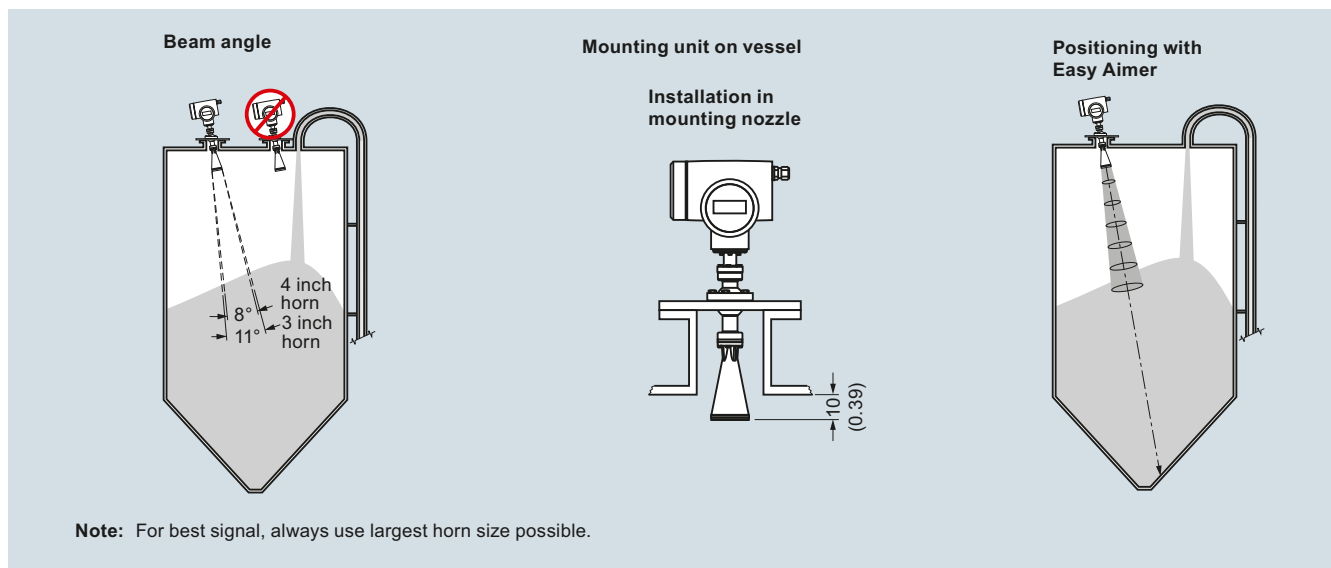
An optional dust cap is available for sticky solids. Optional air purging is also available for extremely sticky applications.

Safe on-site local programming is simple using the Intrinsically Safe handheld programmer. SIMATIC PDM can be used for easy remote programming using HART or PROFIBUS PA.

The characteristics of 24 GHz and high signal-to-noise ratio contribute to exceptional signal reflection, regardless of the dielectric value of the medium.

- Key Applications: long-range dusty applications, cement powder, fly-ash, coal, flour, grain, plastics

Configuration



SITRANS LR460 installation, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	FMCW radar level measurement
Frequency	24.2 ... 25.2 GHz FMCW
Measuring range	0.35 ... 100 m (1.15 ... 328.08 ft)
Output	
Analog output (HART)	
• Signal range	Optically isolated
• Load	Max. 600 Ω
• Fail-safe	mA signal programmable as high, low or hold (LOE)
Communication	HART, optional PROFIBUS PA
Digital output	Relay, NC or NO function, max. 50 V DC, max. 200 mA, rating 5 W
PROFIBUS PA protocol	Layer 1 and 2, Class A, Profile 3.01
Performance (Reference conditions according to IEC 60770-1)	
• Non-linearity	Greater of 25 mm (1 inch) or 0.25 % of span (including hysteresis and non-repeatability), over the full ambient temperature range
• Non-repeatability	≤ 10 mm (0.4 inch)
Rated operating conditions	
• Amb. temperature for enclosure	-40 ... +65 °C (-40 ... +149 °F)
• Location	Indoor/outdoor
• Installation category	II
• Pollution degree	4
Medium conditions	
Dielectric constant	$\epsilon_r > 1.4$
Process temperature range	-40 ... +200 °C (-40 ... +392 °F)
Vessel pressure	0.5 bar g (7.25 psi g) maximum
Design	
Weight	Approx. 6.1 kg (13.4 lb) with 3 inch universal flange
Materials	
• Enclosure	Die-cast aluminum, painted
• Degree of protection	IP67/Type 4X/NEMA 4X/Type 6/NEMA 6
• Cable inlet	2x M20x1.5 or ½" NPT
Process connections	
• Universal flanges, 304 stainless steel, flat faced, with integral Easy Aimer	3 inch/80 mm, 4 inch/100 mm, 6 inch/150 mm (mates with flange EN 1092-1, ASME B16.5, or JIS B2238 bolt pattern), 0.5 bar g (7.25 psi g) max. pressure
Programming	
Intrinsically Safe Siemens handheld programmer (ordered separately)	Infrared receiver
• Approvals for handheld programmer	IS model with ATEX II 1G EEx ia IIC T4, CSA/FM Class I, Div. 1, Groups A, B, C, D T6 at max. ambient temperature of 40 °C (104 °F)
Handheld communicator	HART Communicator 375
PC	SIMATIC PDM
Display (local)	Alphanumeric LCD for readout and entry
Power supply	
	100 ... 230 V AC ± 15 % (50/60 Hz), 6 W (12 VA)
	or
	24 V DC +25/-20 %, 6 W (optional)
Certificates and approvals	
General	CSA _{US/C} , CE, FM, RCM
Radio	European Radio (R&TTE), Industry Canada, FCC, RCM
Hazardous Areas	CSA/FM Class II, Div. 1, Groups E, F and G, Class III ATEX II 1D, 1/2 D, 2D T85 °C INMETRO ExtD A20 IP67 T85 °C GOST Ex DIP A20 T _a 85 °C IP67
Optional equipment	
Dust cap	PTFE
Air purge connection	1/8" NPT

Level Measurement

Continuous level measurement – Radar transmitters

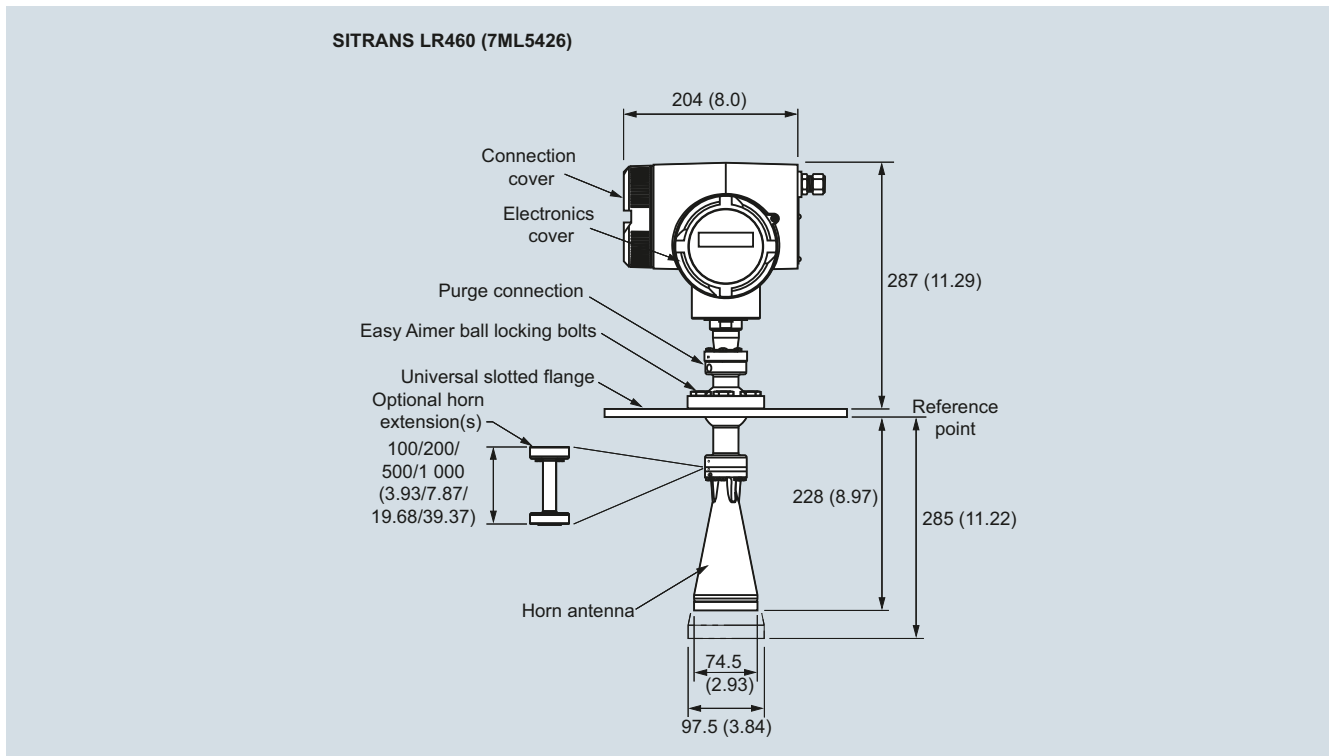
SITRANS LR460

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LR460 4-wire, 24 GHz FMCW radar level transmitter with extremely high signal-to-noise ratio and advanced signal processing for continuous monitoring of solids up to 100 m (328 ft). It is ideal for measurement in extreme dust. Order handheld programmer separately ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5426- 0 ■ ■ 0 - ■ ■ 0	Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	 Y15 C11
Process connection Universal, flat faced, 0.5 bar g (7.25 psi g) maximum with integral Easy Aimer ball 3 inch (80 mm) 4 inch (100 mm) 6 inch (150 mm)	A B C	Operating Instructions English French German Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5JM02 7ML1998-5JM11 7ML1998-5JM32 A5E32007360
Antenna 3" horn antenna, fits 80 mm (3 inch) nozzles 3" horn antenna, fits 80 mm (3 inch) nozzles with 100 mm extension 3" horn antenna, fits 80 mm (3 inch) nozzles with 200 mm extension 3" horn antenna, fits 80 mm (3 inch) nozzles with 500 mm extension ¹⁾ 3" horn antenna, fits 80 mm (3 inch) nozzles with 1 000 mm extension ¹⁾ 4" horn antenna, fits 100 mm (4 inch) nozzles 4" horn antenna, fits 100 mm (4 inch) nozzles with 100 mm extension 4" horn antenna, fits 100 mm (4 inch) nozzles with 200 mm extension 4" horn antenna, fits 100 mm (4 inch) nozzles with 500 mm extension ¹⁾ 4" horn antenna, fits 100 mm (4 inch) nozzles with 1 000 mm extension ¹⁾	A B C D E F G H J K	Accessories Handheld programmer, Infra-red, Intrinsically Safe, EEx ia Dust cap, PTFE, for 3 inch/80 mm horn Dust cap, PTFE, for 4 inch/100 mm horn HART modem/USB (for use with a PC and SIMATIC PDM) One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART ¹⁾ One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA ¹⁾ SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7 For applicable back up point level switch - see point level measurement section	7ML5830-2AJ 7ML1930-1BL 7ML1930-1BM 7MF4997-1DB 7ML1930-1AP 7ML1930-1AQ 7ML5741-... 7ML5740-... 7ML5744-... 7ML5750-...
Purge (self-cleaning) connection No purge connection Purge connection	0 1		
Output/Communication 4 ... 20 mA, HART PROFIBUS PA	0 1		
Power supply/cable inlet 100 ... 230 V AC • 2 x M20x1.5 • 2 x ½" NPT 24 V DC • 2 x M20x1.5 • 2 x ½" NPT	A B C D		
Approvals General Purpose, CSAus/c, Industry Canada, FM, FCC, CE and R&TTE, RCM CSA/FM Class II, Div. 1, Groups E, F, and G, Class III ATEX II 1/2 D T6, CE, R&TTE	A B C		

¹⁾ Available with Purge option 0 only

¹⁾ Product shipped with plastic cable gland, rated to -20 °C. If -40 °C rating required, then metallic cable gland is recommended.

Dimensional drawings



SITRANS LR460, dimensions in mm (inch)

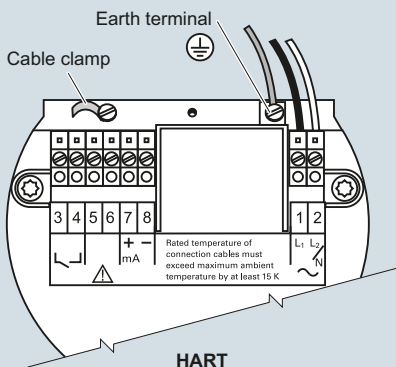
Level Measurement

Continuous level measurement – Radar transmitters

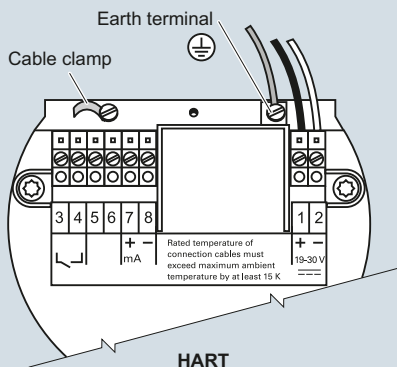
SITRANS LR460

Schematics

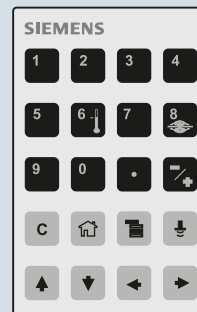
AC version



DC version

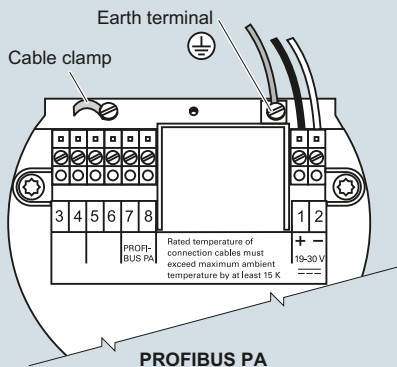
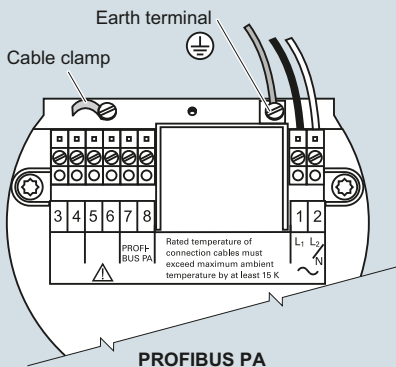


Hand programmer



SITRANS LR460

Part number:
7ML5830-2AJ



Notes


- Recommended torque on terminal clamping screws, 0.5 ... 0.6 Nm
- 4 ... 20 mA, PROFIBUS PA, DC input circuits, 14 ... 20 AWG, shielded copper wire
- AC input circuit, min. 14 AWG copper wire
- All field wiring must have insulation suitable for at least 250 V
- The equipment must be protected by a 15 A fuse or circuit breaker in the building installation

SITRANS LR460 connections

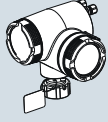
4

Selection and ordering data

SITRANS LR260/LR460 Specials

	Article No.
Process connection part kits - non-pressure-rated	
LR260/LR460, 100 mm extension for horn antenna, no purge ¹⁾	A5E01087872
LR260/LR460, 200 mm extension for horn antenna, no purge ¹⁾	A5E01091262
LR260/LR460, 100 mm extension for horn antenna with purge ¹⁾	A5E01261979
LR260/LR460, 200 mm extension for horn antenna with purge ¹⁾	A5E01261981
LR260/LR460, horn 2", no purge, no emitter ¹⁾	A5E02083905
LR260/LR460, horn 3", no purge, no emitter ¹⁾	A5E01623511
LR260/LR460, horn 4", no purge, no emitter ¹⁾	A5E01623512
LR260/LR460, horn 2", with purge, no emitter ¹⁾	A5E02083906
LR260/LR460, horn 3", with purge, no emitter ¹⁾	A5E01623513
LR260/LR460, horn 4", with purge, no emitter ¹⁾	A5E01623514
LR260/LR460, 3" universal flat faced flange ¹⁾	A5E02303897
LR260/LR460, 4" universal flat faced flange ¹⁾	A5E01259467
LR260/LR460, 6" universal flat faced flange ¹⁾	A5E01261834
LR260/LR460 O-Rings for Easy Aimer ¹⁾	A5E01261836
Kit, Emitter for LR260/LR460 ¹⁾	A5E02360694
LR260 lid with O-ring	A5E02465410
Purge conversion kit – non-pressure-rated (no flange or extension included)	
LR260/LR460 purge conversion, 2" horn ¹⁾	A5E02083914
LR260/LR460 purge conversion, 3" horn ¹⁾	A5E02083915
LR260/LR460 purge conversion, 4" horn ¹⁾	A5E02083916
Enclosure with electronics	
	
LR260 enclosure with board stack, HART communication, M20 cable inlet, approval option A, no process connection	A5E02203605
LR260 enclosure with board stack, PROFIBUS PA communication, M20 cable inlet, approval option A, no process connection	A5E02213423
LR260 enclosure with board stack, HART communication, NPT cable inlet, approval option A, no process connection	A5E02165924
LR260 enclosure with board stack, PROFIBUS PA communication, NPT cable inlet, approval option A, no process connection	A5E02213428
Sitrans LR260 enclosure with board stack, HART communication, NPT cable inlet, approval option D, no process connection	A5E03934184
Sitrans LR260 enclosure with board stack, HART communication, M20 cable inlet, approval option E, no process connection	A5E03934187
LR260 enclosure with board stack, HART communication, NPT cable inlet, approval option F, no process connection	A5E03934191
LR260 enclosure with board stack, PROFIBUS PA communication, M20 cable inlet, approval option F, no process connection	A5E31820689

SITRANS LR260/LR460 Specials

	Article No.
Enclosure with electronics (LR460)	
	
LR460 enclosure with board stack, HART communication, AC power, M20 cable inlet, approval option A, no process connection	A5E02182085
LR460 enclosure with board stack, PROFIBUS PA communication, AC power, M20 cable inlet, approval option A, no process connection	A5E02212422
LR460 enclosure with board stack, HART communication, AC power, NPT cable inlet, approval option A, no process connection	A5E02212423
LR460 enclosure with board stack, PROFIBUS PA communication, AC power, NPT cable inlet, approval option A, no process connection	A5E02212424
LR460 enclosure with board stack, HART communication, DC power, M20 cable inlet, approval option A, no process connection	A5E02212425
LR460 enclosure with board stack, PROFIBUS PA communication, DC power, M20 cable inlet, approval option A, no process connection	A5E02212426
LR460 enclosure with board stack, HART communication, DC power, NPT cable inlet, approval option A, no process connection	A5E02212428
LR460 enclosure with board stack, PROFIBUS PA communication, DC power, NPT cable inlet, approval option A, no process connection	A5E02212429

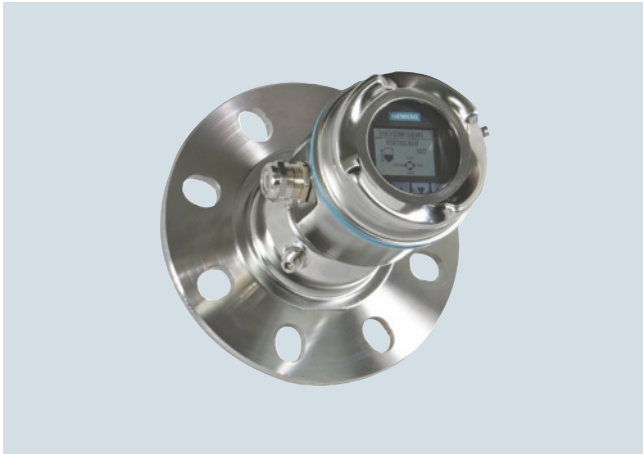
¹⁾ Available with no pressure rating, 0.5 bar g maximum.
Please contact ceg.smpi@siemens.com for special requests.

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR560

Overview



SITRANS LR560 2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids in silos to a range of 100 m (329 ft).

Benefits

- Rugged stainless steel design for industrial applications
- 78 GHz high frequency provides very narrow beam, virtually no mounting nozzle noise, and optimal reflection from sloped solids
- Aimer option to direct beam to area of interest, such as draw point of cone
- Lens antenna is highly resistant to product build-up
- Air purge connection is included for self-cleaning of extremely sticky solids
- Local display interface (LDI) allows local programming and diagnostics

Application

SITRANS LR560's plug and play performance is ideal for most solids applications, including those with extreme dust and high temperatures to 200 °C (392 °F). Unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid. SITRANS LR560 includes an optional graphical local display interface (LDI) that improves setup and operation using an intuitive Quick Start Wizard, and echo profile display for diagnostic support. Start-up is easy using the Quick Start wizard with a few parameters required for basic operation. SITRANS LR560 measures practically any solids material to a range of 100 m (328 ft).

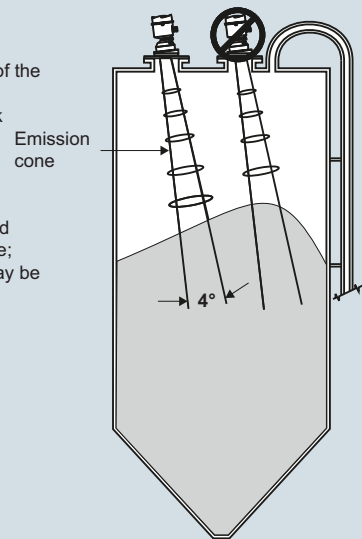
- Key Applications: cement powder, plastic powder/pellets, grain, coal, wood powder, fly ash

Configuration

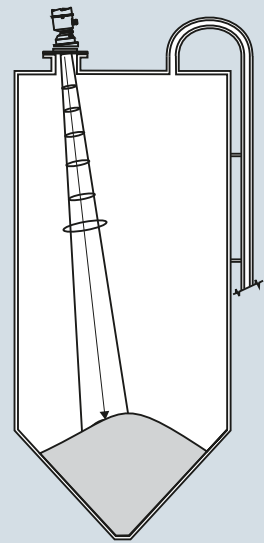
Installation

Note:

- Beam angle is the width of the cone where the energy density is half of the peak energy density
- The peak energy density is directly in front of and in line with the antenna
- There is signal transmitted outside of the beam angle; therefore false targets may be detected



Aiming will assist in measuring material in the cone



SITRANS LR560 installation, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	Radar level measurement
Frequency	78 GHz FMCW
Minimum detectable distance	400 mm (15.75 inch) from sensor reference point
Maximum measuring range ¹⁾	<ul style="list-style-type: none"> • 40 m (131 ft) version • 100 m (328 ft) version
Output	
<ul style="list-style-type: none"> • Analog output • Communications 	4 ... 20 mA <ul style="list-style-type: none"> • HART • Optional: PROFIBUS PA • Optional: FOUNDATION Fieldbus
<ul style="list-style-type: none"> • Fail-safe 	<ul style="list-style-type: none"> • Programmable as high, low or hold (Loss of Echo) • NE43 programmable
Performance (according to reference conditions IEC60770-1)	
<ul style="list-style-type: none"> • Maximum measured error (including hysteresis and non-repeatability)²⁾ 	5 mm (0.2 inch)
Rated operating conditions (according to reference conditions IEC60770-1)	
Installation conditions	
<ul style="list-style-type: none"> • Location 	Indoor/outdoor
Ambient conditions (enclosure)	
<ul style="list-style-type: none"> • ambient temperature • installation category • pollution degree 	-40 ... +80 °C (-40 ... +176 °F) I 4
Medium conditions	
<ul style="list-style-type: none"> • Dielectric constant ϵ_r 	> 1.6
Process temperature and pressure	See chart below
Design	
Enclosure	
<ul style="list-style-type: none"> • Construction • Conduit entry • Purge inlet • Lens material 	316L/1.4404 stainless steel M20x1.5, or ½" NPT via adapter 1/8" NPT, 30 cfm at max. 100 psi <ul style="list-style-type: none"> • 40 m version: PEI • 100 m version: PEEK
	Damage to lens could result from continuous purging/cleaning due to abrasive solids. Recommended purging/cleaning only a few seconds every hour
<ul style="list-style-type: none"> • Degree of protection • Weight • Optional local display interface 	Type 4X/NEMA 4X, Type 6/NEMA 6, IP68 with lid closed 3.15 kg (6.94 lb) including 3 inch flange Graphic LCD, with bar graph representing level
Process connections	
Universal flat-faced flanges ³⁾	<ul style="list-style-type: none"> • 3, 4, 6 inch/80, 100, 150 mm, 304 stainless steel • 3, 4, 6 inch/80, 100, 150 mm, 316L/1.4404 or 316L/1.4435 stainless steel
Aimer flanges ³⁾	3, 4, 6 inch/80, 100, 150 mm, polyurethane powder-coated cast aluminum

Power supply	
4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
PROFIBUS PA/FOUNDATION Fieldbus	13.5 mA 9 ... 32 V DC, per IEC 61158-2
Certificates and approvals	
General	CSA _{US/C} , CE, FM
Radio	Europe (R&TTE), FCC, Industry Canada, RCM
Hazardous	
<ul style="list-style-type: none"> • Europe/International 	IECEx SIR 09.0149X ATEX II 1D, 1/2D, 2D Ex ta IIIC T139 °C Da IP68 ATEX II 3G Ex nA II T4 Gc Ex nL IIC T4 Gc
<ul style="list-style-type: none"> • US/Canada 	FM/CSA Class II, Div. 1, Groups E, F, G Class III T4 FM/CSA Class I, Div. 2, Groups A, B, C, D, T4
<ul style="list-style-type: none"> • China 	NEPSI Ex nA II T4 Ex nL IIC T4 DIP A20 TA, T139 °C, IP68
<ul style="list-style-type: none"> • Brazil 	INMETRO BR-Ex nA/nL II T4 IP68
Programming	
Intrinsically Safe Siemens handheld programmer	Infrared receiver
<ul style="list-style-type: none"> • Approvals for handheld programmer 	IS model: ATEX II 1GD Ex ia IIC T4 Ga Ex iaD 20 T135 °C T _a = -20 ... +50 °C CSA/FM Class I, II, and III, Div. 1, Groups A, B, C, D, E, F, G, T6 T _a = 50 °C
Handheld communicator	HART communicator 375/475
PC	SIMATIC PDM, AMS, PACTware
Display (local)	Graphic local user interface including quick start wizard and echo profile displays

¹⁾ From sensor reference point

²⁾ Under severe EMI/EMC environments per IEC61326-1 or NAMUR NE21, the device error may increase to a maximum of 25 mm (1 inch)

³⁾ Universal flange mates with EN 1092-1 (PN16)/ASME B16.5 (150 lb)/JIS 2220 (10K) bolt hole pattern.

Process temperature and pressure

Version	Stainless steel	Aimer flange: -1 ... 0.5 bar	Aimer flange: -1 ... 3.0 bar
40 m	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)
100 m	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +120 °C (-40 ... +248 °F)

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR560

Selection and Ordering data

SITRANS LR560

2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids in silos to a range of 100 m (329 ft).

Order handheld programmer separately

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Measurement and process temperature range

40 m (131 ft) max range, -40 ... +100 °C

100 m (329 ft) max range, -40 ... +200 °C

Process connection

Universal flat-faced flange fits ANSI/DIN/JIS flanges

3 inch/80 mm, 304 stainless steel

4 inch/100 mm, 304 stainless steel

6 inch/150 mm, 304 stainless steel

3 inch/80 mm, 316L stainless steel

4 inch/100 mm, 316L stainless steel

6 inch/150 mm, 316L stainless steel

3 inch/80 mm, painted aluminum, with integral aimer¹⁾

4 inch/100 mm, painted aluminum, with integral aimer¹⁾

6 inch/150 mm, painted aluminum, with integral aimer¹⁾

Enclosure (with cable inlet)

Stainless steel, 1 X 1/2" NPT

Stainless steel, 1 X M20 x 1.5 (plastic gland included)

Pressure rating

0.5 bar g (7.5 psi g) maximum

3 bar g (40 psi g) maximum

Output/communication

4 ... 20 mA, HART

PROFIBUS PA

FOUNDATION Fieldbus

Approvals

General Purpose, CSA_{US/IC}, Industry Canada, FCC, CE, R&TTE, RCM

CSA/FM Class I, Div. 2, Groups A, B, C, D, Class II, Div. 1, Groups E, F, G, Class III

ATEX II 1 D, 1/2 D, 2 D, 3G Ex nA/nL, CE, R&TTE, RCM

Local display interface

Without LDI (local display interface)

With LDI (local display interface)

¹⁾ Rated to 120 °C max. when used with Pressure rating option 1

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.

Article No.

7ML5440-

0 0 -

A B C D E F G H J

A B

0 1

A B C

A B C

1 2

Selection and Ordering data

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Plug M12 with mating connector¹⁾²⁾³⁾

Plug 7/8" with mating connector¹⁾³⁾⁴⁾

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:
Measuring-point number/identification (max. 27 characters); specify in plain text

Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000

Inspection Certificate Type 3.1 per EN 10204⁴⁾

NAMUR NE43 compliant, device preset to failsafe < 3.6 mA⁵⁾

Operating Instructions for HART device

English

German

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Operating Instructions for PROFIBUS PA device

English

German

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Operating Instructions for FOUNDATION Fieldbus device

English

German

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.

Accessories

Hand Programmer, Intrinsically safe

Local display interface

Sun Shield Cover

Housing lid with window

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART⁶⁾

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA⁶⁾

SITRANS RD100, loop powered display - see Chapter 7

SITRANS RD200, universal input display with Modbus conversion - see Chapter 7

SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7

SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7

For applicable back up point level switch - see point level measurement section

¹⁾ Available with Approval option A only

²⁾ Available with Enclosure option B only

³⁾ Available with Output/communication options B and C only

⁴⁾ Available with Pressure rating option 1 only

⁵⁾ Available with Output/communication option A only

⁶⁾ Product shipped with plastic cable gland, rated to -20 °C. If -40 °C rating required, then metallic cable gland is recommended.

➤ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.

Order code

A50

A55

Y15

C11

C12

N07

Article No.

7ML1998-5KB02

7ML1998-5KB32

A5E32052143

7ML1998-5LT02

7ML1998-5LT32

A5E32043113

7ML1998-5LY02

7ML1998-5LY32

A5E32034712

7ML1930-1BK

7ML1930-1FJ

7ML1930-1FK

7ML1930-1FL

7ML1930-1AP

7ML1930-1AQ

7ML5741-...

7ML5740-...

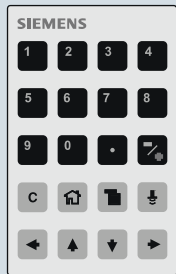
7ML5744-...

7ML5750-...

Options

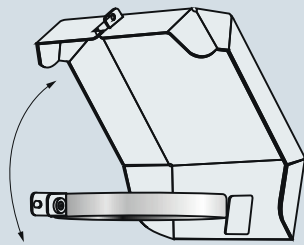
Handheld programmer

Part number:
7ML1930-1BK



Sun shield cover

Part number:
7ML1930-1FK



SITRANS LR560 handheld programmer and sun shield cover

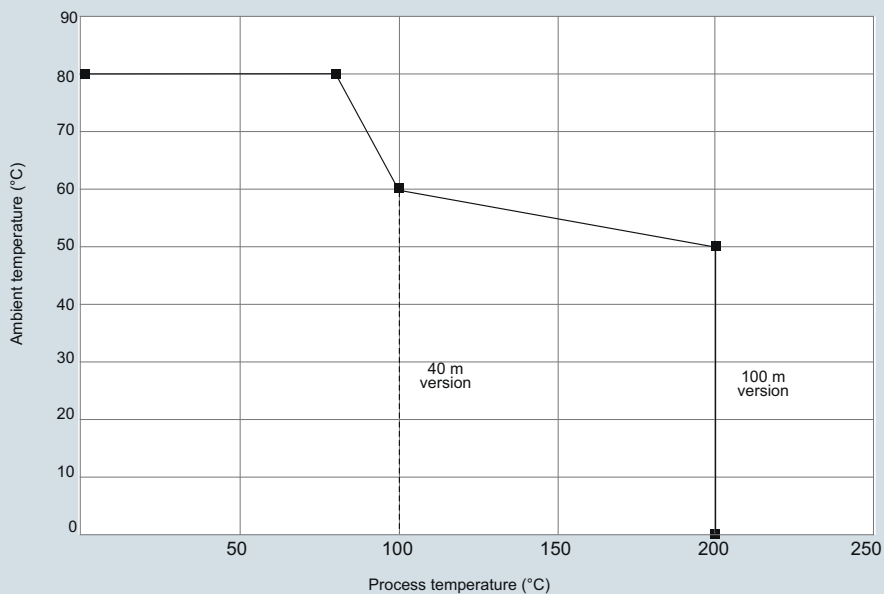
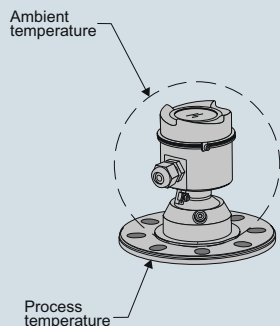
Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR560

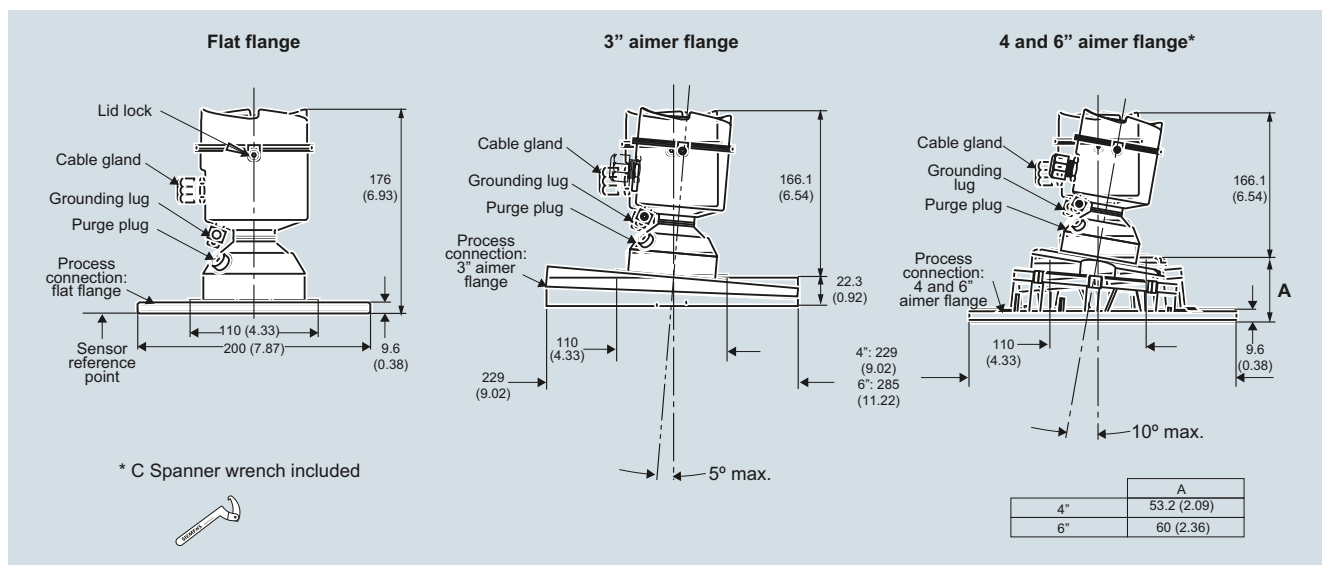
Characteristic curves

Temperature derating curve



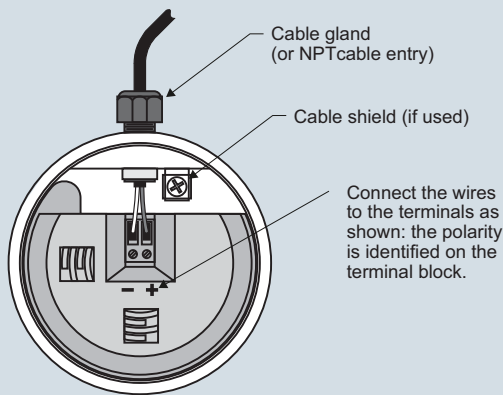
SITRANS LR560 temperature derating curve

Dimensional drawings



SITRANS LR560, dimensions in mm (inch)

Schematics

**Notes:**

1. Depending on the approval rating, glands and plugs may be supplied with your instrument.
2. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
3. All field wiring must have insulation suitable for rated input voltages.
4. Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
5. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

SITRANS LR560 connections

Selection and ordering data

SITRANS LR560 Specials

	Article No.
LR560 Electronics Modules	
LR560 Electronics Module, HART, 100 m range, compatible with 7ML54401XX00XAXX, no enclosure or process connection included.	7ML1830-3AC
LR560 Electronics Module, PROFIBUS PA, 100 m range, compatible with 7ML54401XX00XBXX, no enclosure or process connection included.	7ML1830-3AH
LR560 Electronics Module, FOUNDATION Fieldbus, 100 m range, compatible with 7ML54401XX00XCXX, no enclosure or process connection included.	7ML1830-3AJ
LR560 Electronics Module, HART, 40 m range, compatible with 7ML54400XX00XAXX, no enclosure or process connection included.	7ML1830-3AK
LR560 Electronics Module, PROFIBUS PA, 40 m range, compatible with 7ML54400XX00XBXX, no enclosure or process connection included.	7ML1830-3AL
LR560 Electronics Module, FOUNDATION Fieldbus, 40 m range, compatible with 7ML54400XX00XCXX, no enclosure or process connection included.	7ML1830-3AM
LR560 Miscellaneous Spare Kits	
Kit, Lid Gasket, EPDM, LR560	7ML1830-3AA
Kit, Wrench for 4" and 6" Aimers, LR560	7ML1830-3AB
Kit, O-rings for 3" Aimer, LR560	7ML1830-3AD
Kit, O-rings for 4" Aimer, LR560	7ML1830-3AE
Kit, O-rings for 6" Aimer, LR560	7ML1830-3AF
Kit, Lid Screw and Purge Plug set with Hex Keys, LR560	7ML1830-3AG
Kit, Lid, No Window, LR560	7ML1830-3AP

Please contact ceg.smpi@siemens.com for special requests.

Level Measurement

Continuous level measurement - Guided wave radar transmitters

Guided wave radar transmitters

Overview

Introduction

Guided Wave Radar transmitters use TDR (time domain reflectometry).

Time Domain Reflectometry (TDR)

TDR uses pulses of electromagnetic (EM) energy to measure distances or levels. When a pulse reaches a dielectric discontinuity (created by media surface), part of the energy is reflected. The greater the dielectric difference, the greater the amplitude (strength) of the reflection.

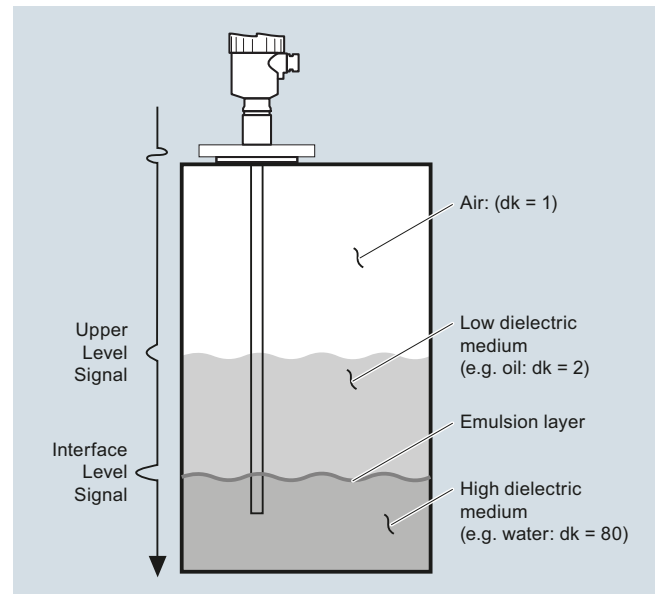
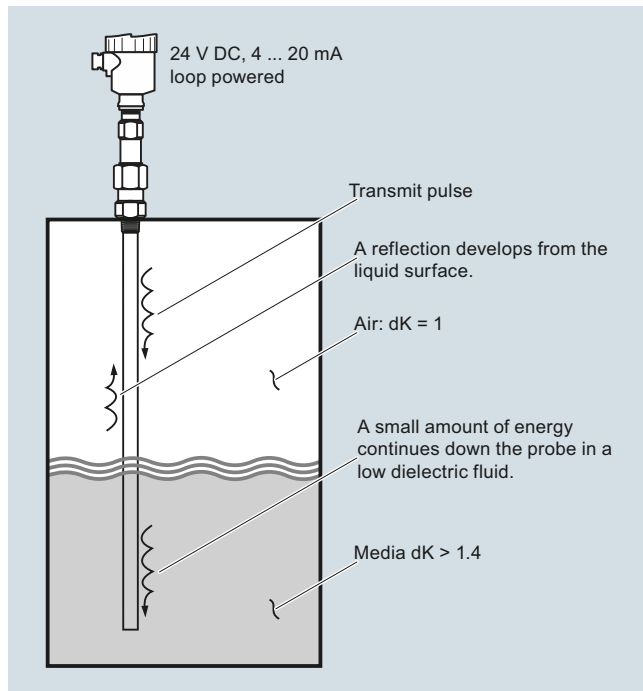
The SITRANS LG includes a transmitter and waveguide that has a characteristic impedance in air and is used as a probe. When part of the probe is immersed in a material other than air, there is lower impedance due to the increase in the dielectric. When an EM pulse is sent down the probe and meets the dielectric discontinuity, a reflection is generated.

Mode of operation

Interface Detection

The SITRANS LG, is a transmitter capable of measuring both an upper level and an interface level. The upper liquid must have a dielectric constant between 1.6 and 10 and the two liquids have a difference in dielectric constants greater than 10. A typical application would be oil over water, with the upper layer of oil being non-conductive with a dielectric constant of approximately 2 and the lower layer of water being very conductive with a dielectric constant of approximately 80. This interface measurement can only be accomplished when the dielectric constant of the upper medium is lower than the dielectric constant of the lower medium.

4



Application

SIEMENS

Guided Wave Radar (Level) Application Questionnaire


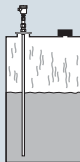
Customer information

Contact: _____ Prepared By: _____
 Company: _____ Date: _____
 Address: _____ Notes on the Application: _____
 City: _____ Country: _____
 Zip/Postal Code: _____ Phone: () _____
 E-mail: _____ Fax: () _____

Tank/Vessel Information

(supply sketch where possible)

Sketch attached

Solids  Liquids 

Tank top:

- Open
- Flat
- Conical
- Parabolic

Tank bottom:

- Sloped
- Flat
- Conical
- Parabolic

Mounting location:

- Top mount
- Thread mount
- Flange mount
- Bypass/Sidepipe mount
- Pipe mount
- Displacer replacement
(please supply drawings)

Tank dimensions:

Height: _____ m/ft
 Diameter: _____ m/ft
 Nozzle Length: _____ cm/inch
 Nozzle Diameter: _____ cm/inch
 Process connection type: _____
 Process connection size: _____
 Distance to sidewall: _____ cm/inch

Pressure:

Normal: _____
 Maximum (relief): _____

Material

Material being measured: _____

Material temperature: Norm: _____ °C/°F Max: _____ °C/°F

Measurement type: Continuous level Interface level

Dielectric constant value: _____

Coating buildup: Yes No **Turbulence:** Yes No

Maximum viscosity: _____ **Density:** _____ kg/m³

Kinematic Viscosity (cSt) = Dynamic Viscosity (cP) / Density (kg/m³)

- 1 ... 5 cSt (like water)
- 5 ... 20 cSt (like machine oil)
- 20 ... 50 cSt (like cooking oil)
- 50 ... 100 cSt (like honey)
- 100 ... 500 cSt (like syrup/molasses)
- >500 cSt (like tar)

Liquid Solid Slurry

Particle size:

- Fine dust/powder, <0.5 cm (0.2 inch)
- Grains (rice, corn), <2 cm (0.8 inch)
- Small stones/gravel, <2 cm (0.8 inch)
- Small rocks/chunks, >2 cm (0.8 inch)
- Large particles, <9 cm (3.5 inch)

Foam type:

- None
- Dry
- Wet
- Wet/dense

Installation (indicate all that apply)

Power available: _____ **Communications:** HART/4 ... 20 mA **Outputs required:** 4 ... 20 mA
 Other (please specify) _____

Products recommended:

Level Measurement

Continuous level measurement - Guided wave radar transmitters

Guided wave radar transmitters

SIEMENS

Guided Wave Radar (Interface) Application Questionnaire

Customer information

Contact: _____ Prepared By: _____
 Company: _____ Date: _____
 Address: _____ Notes on the Application: _____
 City: _____ Country: _____
 Zip/Postal Code: _____ Phone: () _____
 E-mail: _____ Fax: () _____

Tank/Vessel Information

(supply sketch where possible)

Sketch attached

Tank dimensions:

Height: _____ m/ft
 Diameter: _____ m/ft
 Nozzle Length: _____ cm/inch
 Nozzle Diameter: _____ cm/inch
 Process connection type: _____
 Process connection size: _____
 Distance to sidewall: _____ cm/inch

Tank top:

- Open
- Flat
- Conical
- Parabolic

Tank bottom:

- Sloped
- Flat
- Conical
- Parabolic

Mounting location:

- Top mount
- Thread mount
- Flange mount
- Bypass/Sidepipe Mount
- Pipe mount
- Displacer replacement
(please supply drawings)

Pressure:

Normal: _____
 Maximum (relief): _____

Interface Data

Upper material: _____ Lower material: _____ Emulsion layer: Yes
 Upper material thickness: _____ cm/inch Lower material thickness: _____ cm/inch No (preferred)
 Upper material dielectric: _____ Lower material dielectric: _____ Emulsion thickness: _____ cm/inch

Material

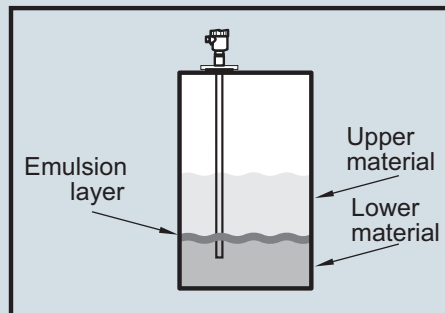
Material being measured: _____ Liquid Slurry

Material temperature: Norm: _____ °C/°F Max: _____ °C/°F

Coating buildup: Yes No Turbulence: Yes No

Maximum Viscosity: _____ Density: _____ kg/m³
Kinematic Viscosity (cSt) = Dynamic Viscosity (cP) / Density (kg/m³)

- 1 ... 5 cSt (like water)
- 5 ... 20 cSt (like machine oil)
- 20 ... 50 cSt (like cooking oil)
- 50 ... 100 cSt (like honey)
- 100 ... 500 cSt (like syrup/molasses)
- >500 cSt (like tar)

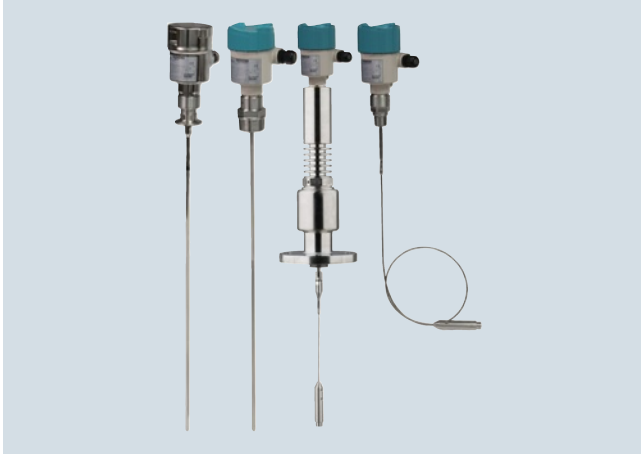


Installation

Power available: _____ Outputs required: 4 ...20 mA
 Communications: HART/ 4 ... 20 mA Other (please specify) _____

Products recommended:

Overview



The Siemens SITRANS LG series are guided wave radar transmitters for level, level/interface, and volume measurement of liquids and solids. The Sitrans LG product line can handle changes in process conditions, high temperatures and pressures, and steam.

Benefits

- High accuracy to ± 2 mm
- Advanced Diagnostics available for high degree of safety
- Simple menu driven display offers ease of setup
- Large range of options offers reliability in most continuous measurement applications
- Ease of maintenance through module design and field replaceable and adjustable probe options
- Perfect solution for wide range of applications from storage to interface with options for extreme pressure and temperature conditions
- Universally applicable in liquids, interface, slurries and solids
- Highly immune to buildup
- Wide range of Hygienic options

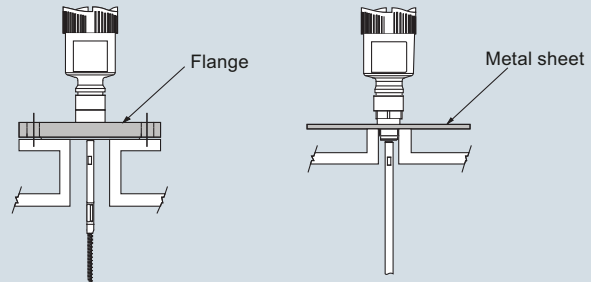
Application

The SITRANS LG series comes in four different models, depending on the applications, level of performance, and functionality required:

- SITRANS LG240 offers configuration options for your hygienic and corrosive application requirements
- SITRANS LG250 Highly flexible solution for liquid level and interface applications. Extremely versatile offering solutions for storage, separation of materials or difficult ammonia applications
- SITRANS LG260 Ideal for measuring level in medium range solids applications including: grains, plastics, and cement
- SITRANS LG270 offers configuration options for extreme conditions including high temperature and high pressure applications such as: harsh applications found in chemical, HPI and energy industries for example, LPG gas tanks, steam boilers and distillation columns

Configuration

Mounting on nozzle

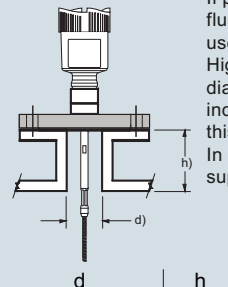


Installation in non-metal vessel

The guided microwave principle requires a metal surface on the process fitting. Therefore, use in plastic vessels etc. an instrument version with flange (from DN 50) or place a metal sheet, $\varnothing > 200$ mm (8 inch), beneath the process fitting when screwing it in.

Make sure that the plate has direct contact with the process fitting

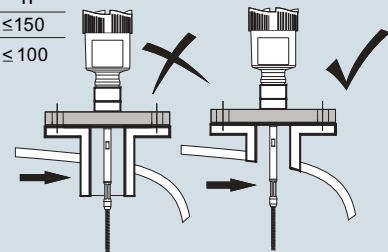
Mounting socket



If possible, avoid sockets, mount the sensor flush with the vessel top. If this is not possible, use short sockets with small diameter. Higher sockets or sockets with a bigger diameter can generally be used. They simply increase the upper blocking distance. Check if this is relevant for your measurement. In such cases, always carry out a false signal suppression after installation.

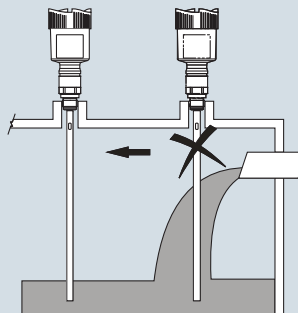
d	h
DN 40 ... DN 150	≤ 150
> DN 150 ... DN 200	≤ 100

Socket must be installed flush



When welding the socket, make sure that the socket is flush to the vessel top.

Before beginning the welding work, remove the electronics module from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.



Inflowing medium

Do not mount the instruments in or above the filling stream. Make sure that you detect the product surface, not the inflowing product.

SITRANS LG Series installation

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Technical specifications

Mode of operation		Design	
Measuring principle	Guided wave radar measurement	Instrument weight (dependent on process fitting) - see manual for further details	Approx. 0.8 ... 8 kg (0.176 ... 17.64 lb)
Measuring range	300 ... 75 000 mm (11.81 ... 2 952.75 inch)	Materials	
Output		• Enclosure	<ul style="list-style-type: none"> Plastic housing plastic PBT (Polyester) Aluminum die-casting housing, aluminum die-casting AISi10 mg, powder-coated- basis: polyester Stainless steel housing, precision casting 316L Stainless steel housing, electropolished 316L
mA analog output with HART digital signal	4 ... 20 mA/HART (SIL optional)	• Degree of protection	<ul style="list-style-type: none"> Type 4/NEMA 4, IP65 Plastic housing IP66/IP67 Aluminum and stainless steel housings are IP66/68
Output range		• Cable inlet	2x M20x1.5 or 2 x 1/2" NPT
• Analog	Current: minimum 3.8 mA, maximum 20.5 mA	Process connections	
• Start-up current	≤ 10 mA for 5 ms after switching on, ≤ 3.6 mA	• Pipe thread, cylindrical (ISO 228 T1)	G3/4" A, G1" A, G1 1/2" A according to DIN 3852-A
Diagnostic alarm	Failure signal current output (adjustable): last valid measured value, ≥ 21 mA, ≤ 3.6 mA	• American pipe thread, conical (ASME B1.20.1)	3/4" NPT, 1" NPT, 1 1/2" NPT
Digital communication	HART Version 7 x and multidrop compatible	• Flanged	DIN from DN 25, ANSI from 1"
Modbus	Modbus RTU, Modbus ASCII, Levelmaster	• Hygienic	Hygienic fittings
PROFIBUS PA		Programming	
Performance		Local	Four button, menu-driven data entry
Process reference conditions according to DIN EN 61298-1		Handheld communicator	Hart communicator
Non-linearity		PC	SIMATIC PDM, AMS, PACTware
• Coaxial	See manual for more details	Power	
• Single rod probes	See manual for more details	2 wire Hart version	9.6 ... 35 V DC
• Interface models	Accuracy ± 2 mm (0.08 inch)	4 wire versions	9.6 ... 48 V DC, 20 ... 42 V AC, 50/60 Hz and 90 ... 253 V AC, 50/60 Hz
Resolution and repeatability	Accuracy ± 2 mm (0.08 inch)	Modbus	8 ... 30 V DC
Accuracy		PROFIBUS PA	9 ... 32 V DC
• Coaxial/rod/cable probes	± 2 mm (0.08 inch)	Note: see manual for specific power based on ordered options	
• Interface models	± 5 mm (0.197 inch)	Certificates and approvals	
	(Note: Typical deviation, Interface measurement)	Hazardous approvals:	ATEX, FM, CSA, IECex
	See manual for more details	Hygienic approvals	EHEDG
Electromagnetic compatibility (check if needed)		Overfill protection	WHG
• Measuring cycle time	< 500 ms	Ship approval	ABS, CCS, GL
• Step response time	≤ 3 s		
• Temperature Effects	The measurement error from the process conditions is in the specified pressure and temperature range of below 1 %		
Rated operating conditions			
• Ambient temperature for enclosure	-40 ... +80 °C (-40 ... +176 °F)		
• LCD readable temperature range	-40 ... +80 °C (-40 ... +176 °F) with display heated option		
• Location	Indoor/outdoor		
• Installation category	II		
• Pollution degree	2		
• Relative Humidity	20 ... 85 %		
Medium conditions			
Dielectric constant	dK ≥ 1.4 (configuration dependent) Note: for measurement below 1.4 use probe end tracking.		
Process temperature range	-196 ... +450 °C (-321 ... +842 °F)		
Vessel pressure	-1 ... +400 bar (-100 ... +40 000 kPa)		

	SITRANS LG240	SITRANS LG250	SITRANS LG260	SITRANS LG270
Industries	Food, Beverage and Pharmaceutical	Chemical/HPI/Power/General	Cement, power generation, food, processing, mineral processing, mining	Chemical/HPI/Power/General
Applications	Hygienic and corrosive applications	Liquids, storage and process vessels with agitators, vaporous liquids, interface	Cement, fly ash, grain, coal, flour, plastics	Aggressive applications in Liquids, storage and process vessels with agitators, vaporous liquids, high temperatures and pressures, low dielectric media
Range	32 m	75 m	60 m	60 m
Performance	± 2 mm	± 2 mm	± 2 mm	± 2 mm
Temperature	-40 ... +150 °C (-40 ... +302 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-196 ... +450 °C (-320.8 ... +842 °F)
Communications	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • Modbus, Modbus RTU, Modbus ASCII, Levelmaster • PROFIBUS PA • SIMATIC PDM • DTM/FDT for PACTware • Fieldcare 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • Modbus, Modbus RTU, Modbus ASCII, Levelmaster • PROFIBUS PA • SIMATIC PDM • DTM/FDT for PACTware • Fieldcare 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • Modbus, Modbus RTU, Modbus ASCII, Levelmaster • PROFIBUS PA • SIMATIC PDM • DTM/FDT for PACTware • Fieldcare 	<ul style="list-style-type: none"> • 4 ... 20 mA/HART • Modbus, Modbus RTU, Modbus ASCII, Levelmaster • PROFIBUS PA • SIMATIC PDM • DTM/FDT for PACTware • Fieldcare

Level Measurement

Continuous level measurement - Guided wave radar transmitters



SITRANS LG series

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG240	7ML5880-		SITRANS LG240	7ML5880-	
Guided Wave Radar sensor for Hygienic and corrosive continuous level and interface measurement of liquids.			Guided Wave Radar sensor for Hygienic and corrosive continuous level and interface measurement of liquids.		
➔ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Approvals					
Ordinary location CE ⁹⁾	0 A		Bolting DN 50, PN 25 DIN11851/PTFE-TFM 1600	1 4	
ATEX II 1G, 1/2G, 2G Ex ia IIC T6 ⁹⁾	0 E		Bolting DN 65, PN 25 DIN11851/PTFE-TFM 1600	1 5	
ATEX II 1G, 1/2G 2G Ex ia IIC + ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ¹¹⁾¹³⁾¹⁵⁾²⁴⁾	0 H		Flange DN 25, PN 40 Form C, DIN 2501/PTFE-TFM 1600	2 0	
ATEX II 1/2G, 2G Ex d ia IIC T6 ¹⁾¹²⁾	0 J		Flange DN 40, PN 40 Form C, DIN 2501/PTFE-TFM 1600	2 1	
ATEX II 1/2G, 2G Ex d ia IIC + ATEX II 1/2D, 2D IP6x ¹⁾¹¹⁾¹²⁾¹³⁾¹⁵⁾²⁴⁾	0 K		Flange DN 50, PN 40 Form C, DIN 2501/PTFE-TFM 1600	2 2	
ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ¹¹⁾¹³⁾¹⁵⁾²⁴⁾	0 N		Flange DN 50, PN 40 Form V13, DIN 2513/PTFE-TFM 1600	2 3	
IEC Ex ia IIC T6 ⁹⁾	0 P		Flange DN 65, PN 40 Form C, DIN 2513/PTFE-TFM 1600	2 4	
IEC Ex ia IIC T6 + IEC IP6x T tD ¹¹⁾¹³⁾¹⁵⁾²⁴⁾	0 Q		Flange DN 80, PN 40 Form C, DIN 2501/PTFE-TFM 1600	2 5	
IEC Ex d ia IIC T6 ¹⁾¹²⁾	0 R		Flange DN 100, PN 16 Form C, DIN 2501/PTFE-TFM 1600	2 6	
IEC Ex d ia IIC T6 + IEC IP6x T tD ¹⁾¹¹⁾¹²⁾¹³⁾¹⁵⁾²⁴⁾	0 S		Flange DN 80, PN 40 EN1092-1 Form B1/PTFE-TFM 1600	2 7	
FM (NI) Class I, Div. 2, Groups A, B, C, D	1 A		Flange DN 100, PN 40 EN1092-1 Form B1/PTFE-TFM 1600	2 8	
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F	1 B		Flange 2" 150 lb RF, ANSI B16.5/PTFE-TFM 1600	3 0	
FM(XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾¹²⁾	1 C		Flange 2" 300 lb RF, ANSI B16.5/PTFE-TFM 1600	3 1	
CSA (NI) Class I, Div. 2, Groups A, B, C, D (DIP) Class II, III, Div. 1, Groups E, F, G ¹⁾¹³⁾¹⁵⁾	1 E		Flange 3" 150 lb RF, ANSI B16.5/PTFE-TFM 1600	3 2	
CSA (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G	1 F		Flange 4" 150 lb RF, ANSI B16.5/PTFE-TFM 1600	3 3	
CSA (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾¹²⁾	1 G				
Probe version/Material			Electronics		
Probe cable ø4 mm (0.16 inch) with gravity weight/PFA ²⁾⁷⁾	A		Two-wire 4 ... 20mA/HART	0	
Probe exchangeable rod (ø8 mm) / 1.4435 (BN2), can be autoclaved (Ra < 0.76 µm) ³⁾⁷⁾	B		Four-wire Modbus ¹⁹⁾²⁰⁾²¹⁾²²⁾	1	
Probe exchangeable rod (ø8 mm) / 1.4435 (BN2), (Ra < 0.76 µm) ³⁾⁷⁾	C		Two-wire 4...20mA/HART with SIL qualification ¹⁷⁾¹⁸⁾	2	
Probe rod ø10 mm (0.39 inch)/PFA ²⁾⁷⁾	D		Four-wire 4...20mA/HART; 90...253V AC; 50/60 Hz ¹⁾⁸⁾¹⁰⁾	3	
			Four-wire 4...20mA/HART; 9.6...48V DC; 20...42 V AC ¹⁾⁸⁾¹⁰⁾	4	
			PROFIBUS PA	5	
Process fitting/Material			Seal/Process temperature		
Clamp 2" PN 16 (ø64 mm) DIN 32676, ISO 2852/1.4435 (BN2) ⁴⁾	0 0		Without glass seal/-40 ... +150 °C (-40 ... +302 °F) ⁵⁾¹¹⁾	A	
Clamp 2" PN 16 (ø64 mm) DIN 32676, ISO 2852/PTFE-TFM 1600	0 1		FFKM (Kalrez 6221)/-20...150 °C (-4... +302 °F)	B	
Clamp 2½" PN 10 (ø77.5 mm) DIN 32676, ISO 2852/1.4435 (BN2) ⁴⁾	0 2		EPDM (Freudenberg 70 EPDM 291)/-20...130 °C (-4 ... +266 °F)	C	
Clamp 2½" PN 10 (ø77.5 mm) DIN 32676, ISO 2852/PTFE-TFM 1600	0 3				
Clamp 3" PN 10 (ø91 mm) DIN 32676, ISO 2852/1.4435 (BN2) ⁴⁾	0 4		Housing/Protection/Cable		
Clamp 3" PN 10 (ø91 mm) DIN 32676, ISO 2852/PTFE-TFM 1600	0 5		Plastic IP66/IP67 M20x1.5/blind stopper	A	
Clamp 4" PN6 (ø119 mm) DIN 32676, ISO 2852/1.4435(BN2) ⁴⁾	0 6		Plastic IP66/IP67 ½" NPT/blind stopper	B	
Clamp 4" PN6 (ø119 mm) DIN 32676, ISO 2852/PTFE-TFM 1600	0 7		Aluminium/IP66/IP68 (0.2 bar) M20x1.5/ blind stopper	C	
Bolting DN 32, PN 40 DIN11851/ 1.4435(BN2) ⁴⁾	0 8		Aluminium/IP66/IP68 (0.2 bar) ½" NPT/ blind stopper	D	
Bolting DN 32, PN 40 DIN11851/PTFE-TFM 1600	1 0		Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	E	
Bolting DN 40, PN 40 DIN11851/ 1.4435 (BN2) ⁴⁾	1 1		Aluminium double chamber/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	F	
Bolting DN 40, PN 40 DIN11851/PTFE-TFM 1600	1 2		Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	G	
Bolting DN 50, PN 25 DIN11851/ 1.4435(BN2) ⁴⁾	1 3		Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	H	
			Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	J	

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG240	7ML5880-		SITRANS LG240	7ML5880-	
Guided Wave Radar sensor for Hygienic and corrosive continuous level and interface measurement of liquids.			Guided Wave Radar sensor for Hygienic and corrosive continuous level and interface measurement of liquids.		
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) ½" NPT/blind stopper		K	Further designs (mandatory)		Order Code
Stainless steel double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper		L	Please add "-Z" to Article No. and specify Order code(s).		
Stainless steel double chamber/IP66/IP68 (0.2 bar) ½" NPT/blind stopper		M	Supplementary electronics		
Aluminium/IP66/IP68 (0.2 bar) M20x1.5/ cable gland stainless steel		N	Without		A00
Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel		P	Additional current output 4 ... 20 mA ¹⁾²³⁾		A01
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/Cable gland stainless steel		Q	Local display interface		
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel		R	Without		E00
Aluminium single chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated		W	Mounted		E01
Aluminium double chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated		X	Laterally mounted ¹⁾		E02
Stainless steel single chamber (precision casting) / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated		Y	Language of display		
			German		L00
			English		L01
			French		L02
			Dutch		L03
			Italian		L04
			Spanish		L05
			Portuguese		L06
			Russian		L07
			Chinese		L08
			Japanese		L09
			Operating instructions		
			German		M00
			English		M01
			French		M02
			Spanish		M03
Lengths			Selection and Ordering data		Order code
Rod ø8 mm (0.31 inch)/1.4435 (Basle standard 300 ... 4 000 mm)			Further designs (optional)		
300 ... 1 000 mm (11.81 ... 39.37 inch) ¹⁴⁾		0	Please add "-Z" to Article No. and specify Order code(s).		
1 001 ... 2 000 mm (39.41 ... 78.74 inch) ¹⁴⁾		1	Enter the total insertion length in plain text description		Y01
2 001 ... 3 000 mm (78.78 ... 118.11 inch) ¹⁴⁾		2	Enter the total length of rigid part (cable version only)		Y02
3 001 ... 4 000 mm (118.15 ... 157.48 inch) ¹⁴⁾		3	Cleaning included certificate: oil, grease and silicon cone free		W01
Rod ø10 mm (0.24 inch)/PFA (300 ... 4 000 mm)			Identification Label (measurement loop) stainless steel		Y17
300 mm (11.81 inch) ¹⁴⁾	9	R 1 A	Identification Label (measurement loop) Foil		Y18
500 mm (19.69 inch) ¹⁴⁾	9	R 1 B	3.1 Certificate instrument ¹⁶⁾		C12
300 ... 1 000 mm (11.81 ... 39.37 inch) ¹⁴⁾	9	R 1 C	3.1 Certificate material (NACE0175) ¹⁶⁾		D07
1 001 ... 5 000 mm (39.41 ... 78.74 inch) ¹⁴⁾	9	R 1 D	3.1 Certificate instrument with test data ¹⁶⁾		C25
2 001 ... 3 000 mm (78.78 ... 118.11 inch) ¹⁴⁾	9	R 1 E	2.2 Certificate material ¹⁶⁾		C15
3 001 ... 4 000 mm (118.15 ... 157.48 inch) ¹⁴⁾	9	R 1 F	Quality/test plan ¹⁶⁾		C26
Cable ø4 mm (0.16 inch)/PFA (500 ... 32 000 mm)			Dye penetration test + 3.1 certificate/instrument ¹⁶⁾		C13
500 mm (9.69 inch)	9	R 1 G	X-ray test + 3.1 certificate/instrument ¹⁶⁾		C14
501 ... 1 000 mm (19.72 ... 39.37 inch)	9	R 1 H	Positive material identification test + 3.1 certificate/instrument ¹⁶⁾		C16
1 001 ... 2 000 mm (39.37 ... 196.85 inch)	9	R 1 J	Roughness test + 3.1 certificate/instrument ¹⁶⁾		C18
2 001 ... 4 000 mm (196.89 ... 393.70 inch)	9	R 1 K	Pressure test + 3.1 certificate/instrument ¹⁶⁾		C31
4 001 ... 5 000 mm (393.74 ... 590.55 inch)	9	R 1 L	Helium leak test + 3.1 certificate/instrument ¹⁶⁾		C32
5 001 ... 10 000 mm (590.59 ... 787.40 inch)	9	R 1 M	Ferrite measuring accuracy to DIN32514-1 + 3.1 certificate/instrument ¹⁶⁾		C60
10 001 ... 15 000 mm (787.44 ... 984.25 inch)	9	R 1 N	Pressure test according to Norsok + 3.1 certificate/instrument ¹⁶⁾		C61
15 001 ... 20 000 mm (984.29 ... 1 181.10 inch)	9	R 1 P	5 point calibration certificate + 3.1 certificate/instrument ¹⁶⁾		C62
20 001 ... 25 000 mm (1 181.14 ... 1 377.95 inch)	9	R 1 Q			
25 001 ... 32 000 mm (1 377.99 ... 1 574.80 inch)	9	R 1 R			

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Additional Operating Instructions</i>		<i>Accessories</i>	
German		Sitrans LG, GWR sensor Display Module	A5E34143449
4 ... 20 mA/HART - two-wire, PFA insulated	PBD-51041000	SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
4 ... 20 mA/HART - two-wire, Polished version	PBD-51041001	SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
4 ... 20 mA/HART - four-wire PFA insulated	PBD-51041002	SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
4 ... 20 mA/HART - four-wire Polished version	PBD-51041003	SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
Modbus- PFA insulated	PBD-51041004	For applicable back up point level switch - see point level measurement section	
Modbus protocol, Polished version	PBD-51041005		
PROFIBUS PA, PFA insulated	PBD-51041006		
PROFIBUS PA, polished version	PBD-51041007		
English		1) Available with Housing/Protection/Cable options E,F, L, M only	
4 ... 20 mA/HART - two-wire PFA insulated	PBD-51041037	2) Available only with PFA Process Fitting/Material including options 01, 03, 05, 07, 10, 12, 14 ... 33 (PTFE-TFM 1600 options)	
4 ... 20 mA/HART - two-wire Polished version	PBD-51041038	3) Available only with Process Fitting/Material options 00, 02, 04, 06, 08, 11, and 13 [1.4435 (BN2) options]	
4 ... 20 mA/HART - four-wire PFA insulated	PBD-51041039	4) Available with Length options 0, 1, 2, 3 only (Rod ø8 mm 1.4435 options)	
4 ... 20 mA/HART - four-wire Polished version	PBD-51041040	5) Available with Length options R1A ... R1R only (Rod ø10 mm/PFA and Cable ø4 mm/PFA options)	
Modbus- PFA insulated	PBD-51041041	7) Available only with the same rod or cable diameter in Length options	
Modbus protocol, Polished version	PBD-51041042	8) Available with Supplementary electronic option A00 and Indicating/Adjustment modules E00, E01	
PROFIBUS PA, PFA insulated	PBD-51041043	9) Available with Supplementary electronic option A01 approval options 0A,0E, and 0P	
PROFIBUS PA, polished version	PBD-51041044	10) Available with Approval options 0A,0J,0K,0N,0R,OS,1A,1C,1E,1F, and 1G	
French		11) Available with Version/Material options A and D only	
4 ... 20 mA/HART - two-wire PFA insulated	PBD-51041111	12) Available with Indicating/adjustment modules E00 and E01	
4 ... 20 mA/HART - two-wire Polished version	PBD-51041112	13) Available with Seal/Process temperature C only	
4 ... 20 mA/HART - four-wire PFA insulated	PBD-51041113	14) Not available with Y02	
4 ... 20 mA/HART - four-wire Polished version	PBD-51041114	15) Available with Housing/Protection options C, D, E, F, G, H, L, M	
Modbus- PFA insulated	PBD-51041115	16) Listed Certificates are not available with all configurations, please contact factory for more information	
Modbus protocol, Polished version	PBD-51041116	17) SIL electronic option 2 available with Approval options 0A, 0E, 0H, 0N, 0P, 0Q, 1A, 1B, 1E and 1F	
PROFIBUS PA, PFA insulated	PBD-51041117	18) Available with Supplementary electronic option A00, SIL electronics	
PROFIBUS PA, polished version	PBD-51041118	19) Modbus only available with Approval options GP and NI and XP-IS/Ex d ia	
Spanish		20) Modbus only available with two chamber housing options	
4 ... 20 mA/HART - two-wire PFA insulated	PBD-51041074	21) Modbus not available with Supplementary electronic (only for HART) option	
4 ... 20 mA/HART - two-wire Polished version	PBD-51041075	22) Modbus not available with lateral mount display option	
4 ... 20 mA/HART - four-wire PFA insulated	PBD-51041076	23) Not available with indicating/adjustment module E02	
4 ... 20 mA/HART - four-wire Polished version	PBD-51041077	24) Available with Housing/protection options D, F, H and M	
Modbus- PFA insulated	PBD-51041078		
Modbus protocol, Polished version	PBD-51041079		
PROFIBUS PA, PFA insulated	PBD-51041080		
PROFIBUS PA, polished version	PBD-51041081		

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG250	7ML5881-		SITRANS LG250	7ML5881-	
A guided wave radar sensor for continuous level and interface measurement of liquids.			A guided wave radar sensor for continuous level and interface measurement of liquids.		
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Approvals			Process fitting/Material		
Ordinary location CE ¹⁶⁾	0 A		Thread G ³ / ₄ " (DIN 3852-A) PN 6/316L	0 0	
Shipping approval ¹⁹⁾²⁸⁾²⁹⁾	0 B		Thread ³ / ₄ " NPT (ASME B1.20.1) PN 6/316L	0 1	
ATEX II 1G, 1/2G, 2G Ex ia IIC T ₆ ¹⁶⁾	0 E		Thread G ³ / ₄ " (DIN 3852-A) PN 40/316L	0 2	
ATEX II 1G, 1/2G, 2G Ex ia IIC T ₆ + shipping approval GL ¹⁹⁾²⁸⁾²⁹⁾	0 G		Thread ³ / ₄ " NPT (ASME B1.20.1) PN 40/316L	0 3	
ATEX II 1G, 1/2G 2G Ex ia IIC + ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ¹⁾²¹⁾²³⁾⁴⁰⁾	0 H		Thread G ³ / ₄ " (DIN 3852-A) PN 100/316L	0 4	
ATEX II 1/2G, 2G Ex d ia IIC T ₆ ¹⁾²¹⁾	0 J		Thread ³ / ₄ " NPT (ASME B1.20.1) PN 100/316L	0 5	
ATEX II 1/2G, 2G Ex d ia IIC + ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ¹⁾²¹⁾²³⁾⁴⁰⁾	0 K		Thread G 1" (DIN 3852-A) PN 40/316L	0 6	
ATEX II 1/2G, 2G Ex d IIC T ₆ ¹⁴⁾²⁰⁾	0 L		Thread 1" NPT (ASME B1.20.1) PN 40/316L	0 7	
ATEX II 1/2G, 2G Ex d IIC + ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ¹⁴⁾²⁰⁾²³⁾⁴⁰⁾	0 M		Thread G 1" (DIN 3852-A) PN 100/316L	0 8	
ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ²⁰⁾²³⁾⁴⁰⁾	0 N		Thread 1" NPT (ASME B1.20.1) PN 100/316L	1 0	
IEC Ex ia IIC ¹⁶⁾	0 P		Thread G 1 ¹ / ₂ " (DIN 3852-A) PN 40/316L	1 1	
IEC Ex ia IIC T ₆ + IEC IP6x T tD ¹⁶⁾²⁰⁾²³⁾⁴⁰⁾	0 Q		Thread 1 ¹ / ₂ " NPT (ASME B1.20.1) PN 40/316L	1 2	
IEC Ex d ia IIC T ₆ ¹⁾²¹⁾²³⁾⁴⁰⁾	0 R		Thread G 1 ¹ / ₂ " (DIN 3852-A) PN 100/316L	1 3	
IEC Ex d ia IIC T ₆ + IEC IP6x T tD ¹⁾²⁰⁾²¹⁾⁴⁰⁾	0 S		Thread 1 ¹ / ₂ " NPT (ASME B1.20.1) PN 100/316L	1 4	
IEC Ex d IIC T ₆ ¹⁴⁾²⁰⁾	0 T		Thread 2 NPT PN 40, ASME B1.20.1/316L ³⁷⁾³⁸⁾	1 5	
IEC Ex d IIC T ₆ + IEC IP6x T tD ¹⁴⁾²⁰⁾²³⁾⁴⁰⁾	0 U		Flange DN 25 PN 40 Form C, DIN 2501/316L	2 0	
FM (NI) Class I, Div. 2, Groups A, B, C, D	1 A		Flange DN 25 PN 40 Form F, DIN 2501/316L	2 1	
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F	1 B		Flange DN 40 PN 40 Form C, DIN 2501/316L	2 2	
FM(XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾²¹⁾	1 C		Flange DN 50 PN 40 Form C, DIN 2501/316L	2 3	
FM (XP) Class I, Div. 1, Groups A, B, C, D ²⁰⁾	1 D		Flange DN 50 PN 40 form V13, DIN 2513/316L	2 4	
CSA (NI) Class I, Div. 2, Groups A, B, C, D (DIP) Class II, III, Div. 1, Groups E, F, G	1 E		Flange DN 80 PN 40 Form C, DIN 2501/316L	2 5	
CSA (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G	1 F		Flange DN 80 PN 40 Form V13, DIN 2501/316L	2 6	
CSA (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾²¹⁾	1 G		Flange DN 100 PN 16 Form C, DIN 2501/316L	2 7	
CSA (XP) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁴⁾²⁰⁾	1 H		Flange DN 100 PN 16 Form C, DIN 2501/316L	2 8	
Probe version/Material			Flange DN 100PN 40 Form C, DIN 2501/316L	3 0	
Probe exchangeable cable ø2 mm (0.08 inch) with gravity weight/316L ⁸⁾⁹⁾¹¹⁾²⁶⁾	A		Flange DN 100 PN 40 Form V13, DIN 2513/316L	3 1	
Probe exchangeable cable ø2 mm (0.08 inch) center weight/316L ⁸⁾⁹⁾¹²⁾²⁶⁾	B		Flange DN 150 PN 16 Form C, DIN 2501/316L	3 2	
Probe exchangeable cable ø4 mm (0.16 inch) with gravity weight/316L ⁸⁾⁹⁾¹¹⁾²⁶⁾	C		Flange DN 50 PN 40 EN1092-1 Form B1/316L	3 3	
Probe exchangeable cable ø4 mm (0.16 inch) with center weight/316L ⁸⁾⁹⁾¹²⁾²⁶⁾	D		Flange DN 80 PN 40 EN1092-1 Form B1/316L	3 4	
Probe exchangeable rod ø8 mm (0.31 inch)/316L ²⁾⁸⁾¹⁰⁾¹¹⁾²⁶⁾	E		Flange 1" 150 lb RF, ANSI B16.5/316L	3 5	
Probe exchangeable rod ø12 mm (0.47 inch)/316L ³⁾⁸⁾¹⁰⁾¹¹⁾²⁴⁾²⁶⁾	F		Flange 1 ¹ / ₂ " 150 lb RF, ANSI B16.5/316L	3 6	
Probe coax version ø21.3 mm (0.84 inch) with single hole/316L ⁸⁾⁹⁾¹¹⁾²⁶⁾²⁷⁾	G		Flange 2" 150 lb RF, ANSI B16.5/316L	3 7	
Probe coax version ø21.3 mm (0.84 inch) with multiple hole/316L ⁸⁾⁹⁾¹¹⁾²⁶⁾²⁷⁾	H		Flange 2" 300 lb RF, ANSI B16.5/316L	3 8	
Probe coax version ø21.3 mm (0.84 inch) for Ammonia application/316L ⁴⁾⁸⁾⁹⁾¹¹⁾²⁵⁾³¹⁾	J		Flange 3" 150 lb RF, ANSI B16.5/316L	4 0	
Probe coax version ø42.2 mm (1.66 inch) with multiple hole/316L ⁵⁾⁸⁾⁹⁾¹¹⁾²⁴⁾²⁶⁾²⁷⁾	K		Flange 3" 300 lb RF, ANSI B16.5/316L	4 1	
			Flange 4" 150 lb RF, ANSI B16.5/316L	4 2	
			Flange 4" 300 lb RF, ANSI B16.5/316L	4 3	
			Flange 6" 150 lb RF, ANSI B16.5/316L	4 4	
			Flange 6" 300lb RF, ANSI B16.5/316L	4 5	
			Electronics		
			Two-wire 4 ... 20mA/HART	0	
			Four-wire Modbus ³³⁾³⁴⁾³⁵⁾³⁶⁾	1	
			Two-wire 4...20mA/HART with SIL qualification ²⁴⁾³²⁾	2	
			Four-wire 4...20mA/HART; 90...253V AC; 50/60Hz ¹⁾¹⁵⁾¹⁷⁾	3	
			Four-wire 4...20mA/HART; 9.6...48V DC; 20...42V AC ¹⁾¹⁵⁾¹⁷⁾	4	
			PROFIBUS PA	5	

Level Measurement

Continuous level measurement - Guided wave radar transmitters


SITRANS LG series

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG250	7ML5881-		SITRANS LG250	7ML5881-	
A guided wave radar sensor for continuous level and interface measurement of liquids.			A guided wave radar sensor for continuous level and interface measurement of liquids.		
Seal/Second line of defense/ Process temperature			Aluminium double chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated	X	
FKM (SHS FPM 70C3 GLT)/without glass seal/ -40 ... +80 °C (-40 ... +176 °F) ⁶⁾	A		Stainless steel single chamber (precision casting) / IP66/IP68 (0.2 bar) M20x1.5/ Cable gland brass nickel-plated	Y	
FKM (SHS FPM 70C3 GLT)/without glass seal/ -40 ... +150 °C (-40 ... +302 °F)	B				
FFKM (Kalrez 6375)/with glass seal/ -20 ... +200 °C (-4 ... +392 °F)	C		Lengths		
EPDM (A+P 75.5/KW75F)/without glass seal/ -40 ... +80 °C (-40 ... +176 °F)	D		<u>Rod ø8 mm/316L</u>		
EPDM (A+P 75.5/KW75F)/with glass seal/ -40 ... +150 °C (-40 ... +302 °F)	E		300 ... 1 000 mm (11.81 ... 39.37 inch) ²²⁾	0	
FFKM (Kalrez 6375)/with glass seal/ -20 ... +200 °C (-4 ... +392 °F)	F		1 001 ... 2 000 mm (39.41 ... 78.74 inch) ²²⁾	1	
EPDM (A+P 75.5/KW75F)/without glass seal/ -40 ... +80 °C (-40 ... +176 °F) ⁶⁾	G		2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²²⁾	2	
EPDM (A+P 75.5/KW75F)/without glass seal/ -40 ... +150 °C (-40 ... +302 °F)	H		3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²²⁾	3	
EPDM (A+P 75.5/KW75F)/with glass seal/ -40 ... +150 °C (-40 ... +302 °F)	J		4 001 ... 5 000 mm (157.52 ... 196.85 inch) ²²⁾	4	
Silicone FEP coated (A+P FEP-O-SEAL)/without glass seal/ -40 ... +80 °C (-40 ... +176 °F) ⁶⁾	K		5 001 ... 6 000 mm (196.89 ... 236.22 inch) ²²⁾	5	
Silicone FEP coated (A+P FEP-O-SEAL)/without glass seal/ -40 ... +150 °C (-40 ... +302 °F)	L		<u>Rod ø12 mm/316L</u>		
Silicone FEP coated (A+P FEP-O-SEAL)/with glass seal/ -40 ... +150 °C (-40 ... +302 °F)	M		300 ... 1 000 mm (11.81 ... 39.37 inch) ²²⁾	9	R 2 A
With borosilicate glass lead through/with glass seal/ -60 ... +150 °C (-76 ... +302 °F) ⁷⁾	N		1 001 ... 2 000 mm (39.41 ... 196.85 inch) ²²⁾	9	R 2 B
FFKM (Kalrez 6375)/without glass seal/ -20 ... +200 °C	P		2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²²⁾	9	R 2 C
FKM (SHS FPM 70C3 GLT)/with glass seal/ -40 ... 80 °C ⁶⁾	Q		3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²²⁾	9	R 2 D
Housing/Protection/Cable			<u>Cable lengths ø2 or 4 mm/316L</u>		
Plastic IP66/IP67 M20x1.5/blind stopper	A		501 ... 1 000 mm (19.72 ... 39.37 inch)	9	R 2 E
Plastic IP66/IP67 ½" NPT/blind stopper	B		1 000 ... 5 000 mm (39.37 ... 196.85 inch)	9	R 2 F
Aluminium/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	C		5 001 ... 10 000 mm (196.89 ... 393.70 inch)	9	R 2 G
Aluminium/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	D		10 001 ... 15 000 mm (393.74 ... 590.55 inch)	9	R 2 H
Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	E		15 001 ... 20 000 mm (590.59 ... 787.40 inch)	9	R 2 J
Aluminium double chamber/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	F		20 001 ... 25 000 mm (787.44 ... 984.25 inch)	9	R 2 K
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	L		25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)	9	R 2 L
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	M		30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)	9	R 2 M
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	N		35 001 ... 40 000 mm (1 377.99 ... 1 574.80 inch)	9	R 2 N
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	P		40 001 ... 45 000 mm (1 574.84 ... 1 771.65 inch)	9	R 2 P
Stainless steel double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	Q		45 001 ... 50 000 mm (1 771.69 ... 1 968.50 inch)	9	R 2 Q
Stainless steel double chamber/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	R		50 001 ... 55 000 mm (1 968.54 ... 2 165.35 inch)	9	R 2 R
Aluminium/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	S		55 001 ... 60 000 mm (2 165.39 ... 2 362.20 inch)	9	R 2 S
Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	T		60 001 ... 65 000 mm (2 362.24 ... 2 559.06 inch)	9	R 2 T
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	U		65 001 ... 70 000 mm (2 559.09 ... 2 755.91 inch)	9	R 2 U
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	V		70 001 ... 75 000 mm (2 759.94 ... 2 952.76 inch)	9	R 2 V
Aluminium single chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated	W		<u>Coax ø21.3 mm/316L</u>		
			300 ... 1 000 mm (11.81 ... 39.37 inch) ²²⁾	9	R 3 A
			1 001 ... 2 000 mm (39.41 ... 78.74 inch) ²²⁾	9	R 3 B
			2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²²⁾	9	R 3 C
			3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²²⁾	9	R 3 D
			4 001 ... 5 000 mm (157.52 ... 196.85 inch) ²²⁾	9	R 3 E
			5 001 ... 6 000 mm (196.89 ... 236.22 inch) ²²⁾	9	R 3 F
			<u>Coax ø42.2 mm/316L</u>		
			300 ... 1 000 mm (11.81 ... 39.37 inch) ²²⁾	9	R 3 G
			1 001 ... 2 000 mm (39.41 ... 78.74 inch) ²²⁾	9	R 3 H
			2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²²⁾	9	R 3 J
			3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²²⁾	9	R 3 K
			4 001 ... 5 000 mm (157.52 ... 196.85 inch) ²²⁾	9	R 3 L
			5 001 ... 6 000 mm (196.89 ... 236.22 inch) ²²⁾	9	R 3 M

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Order code
SITRANS LG250 A guided wave radar sensor for continuous level and interface measurement of liquids.	7ML5881-		Further designs (optional) Please add "-Z" to Article No. and specify Order code(s).	
Further designs (mandatory) Please add "-Z" to Article No. and specify Order code(s).		Order Code	Enter the total insertion length in plain text description	Y01
Supplementary electronics Without	A00		Enter the total length of rigid part (cable version only)	Y02
Additional current output 4 ... 20 mA ¹⁾³⁹⁾	A01		Cleaning included certificate: oil, grease and silicone free	W01
Dimensions centering weight (diameter/height) Without	B00		Identification Label (measurement loop) stainless steel	Y17
ø40/30 mm	B01		Identification Label (measurement loop) Foil	Y18
ø45/30 mm (for 2 inch tubes)	B02		3.1 Certificate instrument ³⁰⁾	C12
ø75/30 mm (for 3 inch tubes)	B03		3.1 Certificate material (NACE0175) ³⁰⁾	D07
ø95/30 mm (for 4 inch tubes)	B04		3.1-Certificate instrument with test data ³⁰⁾	C25
ø1.57/1.18 inch (for 2 inch schedule 160)	B05		2.2-Certificate material ³⁰⁾	C15
ø1.77/1.18 inch (for 2 inch schedule 40/80)	B06		Quality/test plan ³⁰⁾	C26
ø2.95/1.18 inch (for 3 inch schedule 10/40)	B07		Dye penetration test + 3.1 certificate/instrument ³⁰⁾	C13
ø3.74/1.18 inch (for 4 inch schedule 80)	B08		X-ray test + 3.1 certificate/instrument ³⁰⁾	C14
Rod mounted Without Rod, applicable for coax or cable probe types only ¹⁸⁾	C00		Positive material identification test + 3.1 certificate/instrument ³⁰⁾	C16
Mounted	C01		Roughness test + 3.1 certificate/instrument ³⁰⁾	C18
Not mounted	C02		Pressure test + 3.1 certificate/instrument ³⁰⁾	C31
Local display interface Without ¹³⁾	E00		Helium leak test + 3.1 certificate/instrument ³⁰⁾	C32
Mounted	E01		Ferrite measuring accuracy to DIN32514-1 + 3.1 certificate/instrument ³⁰⁾	C60
Laterally mounted ¹⁾	E02		Pressure test according to Norsok + 3.1 certificate/instrument ³⁰⁾	C61
Language of display German	L00		5 point calibration certificate + 3.1 certificate/instrument ³⁰⁾⁴¹⁾	C62
English	L01		Additional Operating Instructions	Article No.
French	L02		German	
Dutch	L03		4 ... 20 mA/HART - two-wire	PBD-51041010
Italian	L04		4 ... 20 mA/HART - two-wire coax probe	PBD-51041011
Spanish	L05		4 ... 20 mA/HART - four-wire	PBD-51041012
Portuguese	L06		4 ... 20 mA/HART - four-wire coax probe	PBD-51041013
Russian	L07		Modbus	PBD-51041014
Chinese	L08		Modbus- coax probe	PBD-51041015
Japanese	L09		PROFIBUS PA	PBD-51041016
Operating instructions German	M00		PROFIBUS PA - coax probe	PBD-51041017
English	M01		English	
French	M02		4 ... 20 mA/HART - two-wire	PBD-51041047
Spanish	M03		4 ... 20 mA/HART - two-wire Coax probe	PBD-51041048
			4 ... 20 mA/HART - four-wire	PBD-51041049
			4 ... 20 mA/HART - four-wire Coax probe	PBD-51041050
			Modbus	PBD-51041051
			Modbus - coax probe	PBD-51041052
			PROFIBUS PA	PBD-51041053
			PROFIBUS PA - coax probe	PBD-51041054

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data

Article No.

French

4 ... 20 mA/HART - two-wire
 4 ... 20 mA/HART - two-wire Coax probe
 4 ... 20 mA/HART - four-wire
 4 ... 20 mA/HART - four-wire Coax probe
 Modbus
 Modbus- coax probe
 PROFIBUS PA
 PROFIBUS PA - coax probe

PBD-51041121
PBD-51041122
PBD-51041123
PBD-51041124
PBD-51041125
PBD-51041126
PBD-51041127
PBD-51041128

Spanish

4 ... 20 mA/HART - two-wire
 4 ... 20 mA/HART - two-wire Coax probe
 4 ... 20 mA/HART - four-wire
 4 ... 20 mA/HART - four-wire Coax probe
 Modbus
 Modbus- Coax probe
 PROFIBUS PA
 PROFIBUS PA - coax probe

PBD-51041084
PBD-51041085
PBD-51041086
PBD-51041087
PBD-51041088
PBD-51041089
PBD-51041090
PBD-51041091

Accessories

Sitrans LG, GWR sensor Display Module
 SITRANS RD100, loop powered display - see Chapter 7
 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7
 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7
 SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7
 For applicable back up point level switch - see point level measurement section

A5E34143449
7ML5741-...
7ML5740-...
7ML5744-...
7ML5750-...

- 1) Available with Housing/Protection cable options E, F, Q, and R only
- 2) Not available with Process fitting/Material options 04, 05, 08, 10, 13, and 14
- 3) Available only with Process Fitting/Material options 00 ... 10, 11, 12, 23 ... 34 and 37 ... 45 (Not available with threaded connections less than 1.5 inch and flanges < DN 50/2 inch)
- 4) Available with Seal option N only
- 5) Not available with Process fitting/Material options 00 ... 10, 11, 12, 23 ... 34 and 37 ... 45. (Not available with threaded connections less than 1.5 inch and flanges < DN 50/2 inch)
- 6) Available only with Process fitting/Material options 00 and 01 (options with max temp of 80 °C (176 °F) only available with PN 6 rated threaded connections)
- 7) Available with Version/Material option J only
- 8) Available only with the same diameter probe lengths
- 9) Available with Rod mounted option C00 only (Coax and cable version only)
- 10) Available with Rod mounted options C01, C02 only (rod versions only)
- 11) Available only with Centering weight option B00 (no centering weight option)
- 12) Available with Centering weight options B01 ... B08 only
- 13) Available only with Housing/Protection cable options E, F, Q, R, T (double chamber options only)
- 14) Available only with Housing/Protection cable options C, D, L, M and approval option 1D
- 15) Available with Supplementary electronic option A00 and Indicating/Adjustment modules E00, E01
- 16) Available with Supplementary electronic option A01 and Approval options 0A, 0E, and 0P
- 17) Not Available with Approval options 0B ... 0H 0P, 0Q, 1B, and 1F (not available with Intrinsically Safe and shipping approvals)
- 19) Not available with Length options 3, 4, 5, R2C and R2D
- 20) Available only with Seal options C, E, F, J, M, N and Q [second line of defense (with glass seal) for all explosion proof options]
- 21) Available with Indicating/adjustment modules E00 and E01
- 22) Not available with Y02
- 23) Available with Housing/Protection options C, D, E, F, L, M, Q, R (dust approvals)
- 24) SIL electronics option 2 available with Approval options 0A, 0E, 0G, 0H, 0L, 0M, 0N, 0P, 0U, 0Q 0T, 1A, 1B, 1D, 1E, 1F and 1H
- 25) Available with Process Fitting/Material options 04, 05, 08, 10, 13 ... 45
- 26) Not available with Process fitting /Material options 04, 05, 08, 10, 13, and 14
- 27) Not available with Process Fitting/Material options 00 and 01
- 28) Available with Housing/Protection/Cable options A, B, C, D, E, F, L, M, R, S, T, and U
- 29) Available with Electronic option 0 only
- 30) Listed Certificates are not available with all configurations, please contact factory for more information
- 31) Not available with Process fitting/Material options 02, 03, 06, 07, 11, and 12 or threaded options below PN 100
- 32) Available with supplementary electronic option A00, SIL electronics
- 33) Modbus only available with Approval options GP and NI and XP-IS/Ex dia
- 34) Modbus only available with two chamber housing options
- 35) Modbus not available with Supplementary electronic (only for HART) option
- 36) Modbus not available with lateral mount display option
- 37) Not available with version/material option K
- 38) Not available with Seal/Process temperature options A, G K and Q
- 39) Not available Indicating/adjustment module E02
- 40) Available with Housing/protection options D, F, M, R (dust approvals)
- 41) Available with Version/Material A, B, C, D, E and F

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG260	7ML5882-		SITRANS LG260	7ML5882-	
A guided wave radar sensor for level measurement of solids.			A guided wave radar sensor for level measurement of solids.		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Approvals			Process fitting/Material		
Ordinary location CE ⁴⁾¹²⁾	0 A		Thread G ³ / ₄ " (DIN 3852-A) PN 40/316L	0 0	
Shipping approval ⁹⁾¹⁰⁾	0 B		Thread ³ / ₄ " NPT (ASME B1.20.1) PN 40/316L	0 1	
ATEX II 1G, 1/2G, 2G Ex ia IIC T ⁶ 4)12)	0 E		Thread G1" (DIN 3852-A) PN 40/316L	0 2	
ATEX II 1G, 1/2G, 2G Ex ia IIC T6 + shipping approval GL ⁹⁾	0 G		Thread 1" NPT (ASME B1.20.1) PN 40/316L	0 3	
ATEX II 1G, 1/2G 2G Ex ia IIC + ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ⁸⁾¹⁰⁾¹²⁾²¹⁾	0 H		Thread G1 ¹ / ₂ " (DIN 3852-A) PN 40/316L	0 4	
ATEX II 1/2G, 2G Ex d ia IIC T ⁶ 1)7)12)	0 J		Thread 1 ¹ / ₂ " NPT (ASME B1.20.1) PN 40/316L	0 5	
ATEX II 1/2G, 2G Ex d ia IIC + shipping approval (GL) ¹⁾⁷⁾⁹⁾¹⁰⁾	0 L		Thread G2" (DIN 3852-A) PN 40/316L	0 6	
ATEX II 1/2G, 2G Ex d IIC + ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 T ⁸⁾¹¹⁾¹²⁾²¹⁾	0 M		Flange DN 50 PN 40 Form C, DIN 2501/316L	1 0	
ATEX II 1D, 1/2D, 1/3D, 2D, Ex t IIIC IP66 ¹¹⁾¹²⁾	0 N		Flange DN 80 PN 40 Form C, DIN 2501/316L	1 2	
ATEX II 1/2G, 2G Ex d IIC + shipping approval (GL) ⁹⁾¹⁰⁾¹¹⁾	0 Q		Flange DN 100 PN 16 Form C, DIN 2501/316L	1 3	
ATEX II 1/2G, 2G Ex d IIC + II 1D, 1/2D, 1/3D, 2D IP66 ⁸⁾¹¹⁾¹²⁾²¹⁾	0 R		Flange DN 100 PN 40 Form C, DIN 2501/316L	1 4	
ATEX II 1D, 1/2D, 2D IP6x T ⁸⁾¹¹⁾¹²⁾²¹⁾	0 S		Flange DN 150 PN 16 Form C, DIN 2501/316L	1 5	
IEC Ex ia IIC T ⁶ 4)12)	0 T		Flange DN 50 PN 40 EN1092-1 Form B1/316L	1 6	
IEC Ex ia IIC T6 + IEC IP6x T tD ⁸⁾¹¹⁾¹²⁾²¹⁾	0 U		Flange DN 80 PN 40 EN1092-1 Form B1/316L	1 7	
IEC Ex d ia IIC T ⁶ 1)7)12)	1 A		Flange DN 100 PN16 EN1092-1 Form B1/316L	1 8	
IEC Ex d ia IIC T6 + IEC IP6x T tD ⁷⁾⁸⁾¹²⁾²¹⁾	1 B		Flange 2" 150 lb RF, ANSI B16.5/316L	3 0	
IEC Ex d IIC T ⁶ 1)11)12)	1 C		Flange 2" 300 lb RF, ANSI B16.5/316L	3 2	
IEC Ex d IIC T6 + IEC IP6x T tD ⁹⁾¹¹⁾¹²⁾²¹⁾	1 D		Flange 3" 150 lb RF, ANSI B16.5/316L	3 3	
FM (NI) Class I, Div. 2, Groups A, B, C, D ¹²⁾	1 F		Flange 3" 300 lb RF, ANSI B16.5/316L	3 4	
FM (NI) Class I, Div. 2, Groups A, B, C, D + shipping approval (GL) ⁹⁾¹⁰⁾	1 G		Flange 4" 150 lb RF, ANSI B16.5/316L	3 5	
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F ¹²⁾	1 H		Flange 4" 300 lb RF, ANSI B16.5/316L	3 6	
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G + shipping approval (GL) ⁹⁾¹⁰⁾	1 J		Flange 6" 150 lb RF, ANSI B16.5/316L	3 7	
FM (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾⁷⁾¹²⁾	1 K				
FM (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G + shipping approval (GL) ¹⁾⁷⁾⁹⁾¹⁰⁾	1 L				
FM (XP) Class I, Div. 1, Groups A, B, C, D ¹¹⁾¹²⁾	1 M				
CSA (NI) Class I, Div. 2, Groups A, B, C, D; (DIP) Class II, III, Div. 1, Groups E, F, G ⁸⁾¹²⁾	1 N				
CSA (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹²⁾	1 P				
CSA (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾⁷⁾¹²⁾	1 Q				
CSA (XP) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹¹⁾¹²⁾	1 R				
Probe version/Material			Electronics		
Probe exchangeable cable ø 4 mm (0.16 inch) with gravity weight/316	A		Two-wire 4 ... 20mA/HART	0	
Probe exchangeable cable ø 6 mm (0.24 inch) with gravity weight/316 ²⁾	B		Four-wire Modbus ¹⁶⁾¹⁷⁾¹⁸⁾¹⁹⁾	1	
Probe exchangeable rod ø 16 mm (0.63 inch) / 316L ²⁾⁶⁾	E		Two-wire 4...20mA/HART with SIL qualification ¹⁴⁾¹⁵⁾	2	
			Four-wire 4...20mA/HART; 90...253V AC; 50/60Hz ¹⁾³⁾⁵⁾	3	
			Four-wire 4...20mA/HART; 9.6...48V DC; 20...42 V AC ¹⁾³⁾⁵⁾	4	
			PROFIBUS PA	5	
			Seal/Process temperature		
			FKM (SHS FPM 70C3 GLT)/-40 ... +80 °C (-40 ... +176 °F)	A	
			FKM (SHS FPM 70C3 GLT)/-40 ... +150 °C (-40 ... +302 °F)	B	
			FFKM (Kalrez 6375)/-20 ... +200 °C (-4 ... +392 °F)	C	
			EPDM (A+P 75.5/KW75F)/-40 ... +80 °C (-40 ... +176 °F)	D	
			EPDM (A+P 75.5/KW75F)/-40 ... +150 °C (-40 ... +392 °F)	E	
			Housing/Protection/Cable		
			Plastic IP66/IP67 M20x1.5/blind stopper	A	
			Plastic IP66/IP67 ¹ / ₂ " NPT/blind stopper	B	
			Plastic 2-chamber/IP66/IP67/M20x1.5/blind stopper	C	
			Plastic 2-chamber/IP66/IP67 ¹ / ₂ " NPT/blind stopper	D	
			Aluminium/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	E	
			Aluminium/IP66/IP68 (0.2 bar) ¹ / ₂ " NPT/blind stopper	F	
			Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	G	
			Aluminium double chamber/IP66/IP68 (0.2 bar) ¹ / ₂ " NPT/blind stopper	H	
			Stainless Steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	J	

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG260	7ML5882-		SITRANS LG260	7ML5882-	
A guided wave radar sensor for level measurement of solids.			A guided wave radar sensor for level measurement of solids.		
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) 1/2" NPT/blind stopper		K	<u>Cable lengths ø6 mm/316L</u>		
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper		L	500 mm (19.69 inch)	9 R 4 A	
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper		M	501 ... 1 000 mm (19.72 ... 39.37 inch)	9 R 4 B	
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) 1/2" NPT/blind stopper		N	1 001 ... 5 000 mm (39.41 ... 196.85 inch)	9 R 4 C	
Stainless steel double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper		P	5 001 ... 10 000 mm (196.89 ... 393.70 inch)	9 R 4 D	
Stainless steel double chamber/IP66/IP68 (0.2 bar) 1/2" NPT/blind stopper		Q	10 001 ... 15 000 mm (393.74 ... 590.55 inch)	9 R 4 E	
Aluminium/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel		R	15 001 ... 20 000 mm (590.59 ... 787.40 inch)	9 R 4 F	
Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel		S	20 001 ... 25 000 mm (787.44 ... 984.25 inch)	9 R 4 G	
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel		T	25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)	9 R 4 H	
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel		W	30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)	9 R 4 J	
Aluminium single chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated		X	35 001 ... 40 000 mm (1 377.99 ... 1 574.80 inch)	9 R 4 K	
Aluminium double chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated		Y	40 001 ... 45 000 mm (1 574.84 ... 1 771.65 inch)	9 R 4 L	
Stainless steel single chamber (precision casting) / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated			45 001 ... 50 000 mm (1 771.69 ... 1 968.50 inch)	9 R 4 M	
			50 001 ... 55 000 mm (1 968.54 ... 2 165.35 inch)	9 R 4 N	
			55 001 ... 60 000 mm (2 165.39 ... 2 362.20 inch)	9 R 4 P	
Lengths			Further designs (mandatory)	Order Code	
<u>Rod ø16 mm/316L</u>			Please add "-Z" to Article No. and specify Order code(s).		
500 mm (19.69 inch)		0	Supplementary electronics		
501 ... 1 000 mm (19.72 ... 39.37 inch)		1	Without ¹⁾	A00	
1 001 ... 2 000 mm (39.41 ... 78.74 inch)		2	Additional current output 4 ... 20 mA ¹⁾²⁰⁾	A01	
2 001 ... 3 000 mm (78.78 ... 118.11 inch)		3	Rod mounted		
3 001 ... 4 000 mm (118.15 ... 157.48 inch)		4	Without Rod, applicable for coax or cable probe types only	C00	
4 001 ... 5 000 mm (157.52 ... 196.85 inch)		5	Mounted	C01	
5 001 ... 6 000 mm (196.89 ... 216.53 inch)		6	Not mounted	C02	
<u>Cable lengths ø2 or 4 mm/316</u>			Local display interface		
501 ... 1 000 mm (19.72 ... 39.37 inch)	9 R 2 E		Without	E00	
1 001 ... 5 000 mm (39.41 ... 196.85 inch)	9 R 2 F		Mounted	E01	
5 001 ... 10 000 mm (196.89 ... 393.70 inch)	9 R 2 G		Laterally mounted ¹⁾	E02	
10 001 ... 15 000 mm (393.74 ... 590.55 inch)	9 R 2 H		Language of display		
15 001 ... 20 000 mm (590.59 ... 787.40 inch)	9 R 2 J		German	L00	
20 001 ... 25 000 mm (787.44 ... 984.25 inch)	9 R 2 K		English	L01	
25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)	9 R 2 L		French	L02	
30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)	9 R 2 M		Dutch	L03	
35 001 ... 40 000 mm (1 377.99 ... 1 574.80 inch)	9 R 2 N		Italian	L04	
40 001 ... 45 000 mm (1 574.84 ... 1 771.65 inch)	9 R 2 P		Spanish	L05	
45 001 ... 50 000 mm (1 771.69 ... 1 968.50 inch)	9 R 2 Q		Portuguese	L06	
50 001 ... 55 000 mm (1 968.54 ... 2 165.35 inch)	9 R 2 R		Russian	L07	
55 001 ... 60 000 mm (2 165.39 ... 2 362.20 inch)	9 R 2 S		Chinese	L08	
			Japanese	L09	
			Operating instructions		
			German	M00	
			English	M01	
			French	M02	
			Spanish	M03	

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Further designs (optional)		Accessories	
Please add "-Z" to Article No. and specify Order code(s).		Sitrans LG, GWR sensor Display Module	A5E34143449
Enter the total insertion length in plain text description	Y01	SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
Cleaning included certificate: oil, grease and silicone free	W01	SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
Identification Label (measurement loop) stainless steel	Y17	SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
Identification Label (measurement loop) Foil	Y18	SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
3.1 Certificate instrument ¹³⁾	C12	For applicable back up point level switch - see point level measurement section	
3.1 Certificate material (NACE0175) ¹³⁾	D07	1) Available only with Housing/Protection/Cable Options G, H, N, P	
3.1-Certificate instrument with test data ¹³⁾	C25	2) Not available with Process/Fitting/Material options 00, 01, 02, and 03	
2.2-Certificate material ¹³⁾	C15	3) Available with Supplementary electronic option A00 and Indicating/adjustment modules E00, E01	
Quality/test plan ¹³⁾	C26	4) Available with Supplementary electronic option A01	
Dye penetration test + 3.1 certificate/instrument ¹³⁾	C13	5) Not Available with Approval options 0B ... 0H 0L, 0Q, 1B, 1F, 1G, 1J, 1L (not available with Intrinsically Safe and shipping approvals)	
X-ray test + 3.1 certificate/instrument ¹³⁾	C14	6) Available with Rod Mounted options C01 and C02	
Positive material identification test + 3.1 certificate/instrument ¹³⁾	C16	7) Available with Indicating/adjustment modules E00 and E01	
Roughness test + 3.1 certificate/instrument ¹³⁾	C18	8) Available with Housing Protection options E, F, G, H, J, K, N, P	
Pressure test + 3.1 certificate/instrument ¹³⁾	C31	9) Not available with Housing/Protection/Cable options L, M, and T	
Helium leak test + 3.1 certificate/instrument ¹³⁾	C32	10) Available with Electronic option 0 only	
Ferrite measuring accuracy to DIN32514-1 + 3.1 certificate/instrument ¹³⁾	C60	11) Available with Seal/Process temperature option C only	
Pressure test according to Norsok + 3.1 certificate/instrument ¹³⁾	C61	12) Available with Version/Material option E only	
5 point calibration certificate + 3.1 certificate/instrument ¹³⁾	C62	13) Listed Certificates are not available with all configurations, please contact factory for more information	
Operating Instructions	Article No.	14) SIL electronics option 2 available with Approval options 0A, 0E, 0G, 0H, 0N, 0Q, 0R, 0S, 0T, 0U, 1C, 1D, 1F, 1H, 1M, 1N, 1P, and 1R	
German		15) Available with supplementary electronic option A00, SIL electronics	
4 ... 20 mA/HART - two-wire	PBD-51041020	16) Modbus available only with Approval options GP and NI and XP-IS/Ex d ia	
4 ... 20 mA/HART - four-wire	PBD-51041021	17) Modbus available only with two chamber housing options	
Modbus	PBD-51041022	18) Modbus not available with supplementary electronic (only for HART) option	
PROFIBUS PA	PBD-51041023	19) Modbus not available with lateral mount display option	
English		20) Not available with Indicating/adjustment module E02	
4 ... 20 mA/HART - two-wire	PBD-51041057	21) Available with Housing Protection F, H, P and K	
4 ... 20 mA/HART - four-wire	PBD-51041058		
Modbus	PBD-51041059		
PROFIBUS PA	PBD-51041060		
French			
4 ... 20 mA/HART - two-wire	PBD-51041131		
4 ... 20 mA/HART - four-wire	PBD-51041132		
Modbus	PBD-51041133		
PROFIBUS PA	PBD-51041134		
Spanish			
4 ... 20 mA/HART - two-wire	PBD-51041094		
4 ... 20 mA/HART - four-wire	PBD-51041095		
Modbus	PBD-51041096		
PROFIBUS PA	PBD-51041097		

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data

Article No. Order Code

SITRANS LG270

A guided wave radar sensor for continuous level and interface measurement of liquids in aggressive applications

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Approvals

Ordinary location CE ³⁾	0 A
Shipping approval ¹⁷⁾¹⁸⁾¹⁹⁾	0 B
ATEX II 1G, 1/2G, 2G Ex ia IIC T6 ³⁾	0 E
ATEX II 1G, 1/2G, 2G Ex ia IIC T6 + shipping approval GL ¹⁷⁾¹⁸⁾¹⁹⁾	0 G
ATEX II 1G, 1/2G, 2G Ex ia IIC + ATEX II 1D, 1/2D, 2D IP6x ¹⁶⁾²⁸⁾	0 H
ATEX II 1/2G, 2G Ex d ia IIC T6 ¹⁾¹⁰⁾¹⁴⁾	0 J
ATEX II 1/2G, 2G Ex d ia IIC + ship (GL) ¹⁾¹⁰⁾¹⁴⁾¹⁷⁾¹⁸⁾¹⁹⁾	0 L
ATEX II 1/2G, 2G Ex d ia IIC + ATEX II 1/2D, 2D IP6x ¹⁰⁾¹⁴⁾¹⁶⁾²⁸⁾	0 M
ATEX II 1/2G, 2G Ex d IIC T6 ¹¹⁾	0 N
ATEX II 1/2G, 2G Ex d IIC + ship approval (GL) ³⁾¹⁷⁾¹⁸⁾¹⁹⁾	0 Q
ATEX II 1/2G, 2G Ex d IIC + ATEX II 1/2D, 2D IP6x ¹¹⁾¹⁶⁾²⁸⁾	0 R
ATEX II 1D, 1/2D, 2D IP6x T ¹⁶⁾²⁸⁾	0 S
IEC Ex ia IIC T6	0 T
IEC Ex ia IIC T6 + IEC IP6x T tD ¹⁶⁾²⁸⁾	0 U
IEC Ex d ia IIC T6 ¹⁾¹⁰⁾¹⁴⁾	1 A
IEC Ex d ia IIC T6 + IEC IP6x T tD ¹⁰⁾¹⁴⁾¹⁶⁾²⁸⁾	1 B
IEC Ex d IIC T6 ¹¹⁾	1 C
IEC Ex d IIC T6 + IEC IP6x T tD ¹¹⁾¹⁶⁾²⁸⁾	1 D
FM (NI) Class I, Div.2, Groups A, B, C, D	1 F
FM (NI) Class I, Div.2, Groups A, B, C, D + ship approval (GL) ¹⁷⁾¹⁸⁾¹⁹⁾	1 G
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F	1 H
FM (IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G + ship approval (GL) ¹⁷⁾¹⁸⁾¹⁹⁾	1 J
FM (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾¹⁰⁾¹⁴⁾	1 K
FM (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G + shipping approval (GL) ¹⁾¹⁰⁾¹⁷⁾¹⁸⁾¹⁹⁾	1 L
FM (XP) Class I, Div.1, Groups A, B, C, D	1 M
CSA (NI) Class I, Div. 2, Groups A, B, C, D; (DIP) Class II, III, Div.1, Groups E, F, G ¹⁶⁾	1 N
CSA (IS) Class I, II, III, Div.1, Groups A, B, C, D, E, F, G	1 P
CSA (XP-IS) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹⁾¹⁰⁾¹⁴⁾	1 Q
CSA (XP) Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G ¹¹⁾	1 R

Version/Material

Probe exchangeable cable ø 2 mm (0.08 inch) with gravity weight/316L ⁴⁾⁷⁾	A
Probe exchangeable cable ø2 mm (0.08 inch) center weight/316L ⁵⁾⁷⁾	B
Probe exchangeable cable ø4 mm (0.16 inch) with gravity weight/316L ⁴⁾⁷⁾	C
Probe exchangeable cable ø4 mm (0.16 inch) with center weight/316L ⁵⁾⁷⁾	D
Probe exchangeable rod ø 16 mm (0.63 inch) /316L ⁴⁾⁷⁾⁹⁾	E
Probe coax version ø 42.2 mm (1.66 inch) with multiple hole/316L ⁴⁾⁷⁾	F
Probe coax version ø 42.2 mm (1.66 inch); multiple hole; reference distances/316L ⁴⁾⁷⁾¹³⁾	G

Selection and Ordering data

Article No. Order Code

SITRANS LG270

A guided wave radar sensor for continuous level and interface measurement of liquids in aggressive applications

Process fitting/Material

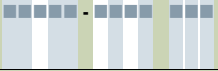
Thread G1½" (DIN 3852-A) PN400/316L	0 0
Thread 1½" NPT (ASME B1.20.1) PN400/316L	0 1
Thread 1½" NPT (ASME B1.20.1) PN400/C22	0 2
Flange DN 50 PN 40 Form C, DIN 2501/316L	1 0
Flange DN 50 PN 40 form V13, DIN 2513/316L	1 1
Flange DN 65 PN 64 Form V13, DIN 2501/316L	1 2
Flange DN 80 PN 40 Form C, DIN 2501/316L	1 3
Flange DN 80 PN 40 Form V13, DIN 2501/316L	1 4
Flange DN 80 PN 100 Form L, DIN 2501/316L	1 5
Flange DN 100 PN 16 Form C, DIN 2501/316L	1 6
Flange DN 100 PN 16 Form C, DIN 2501/316L	1 7
Flange DN 100 PN 40 Form C, DIN 2501/316L	1 8
Flange DN 100 PN 40 Form V13, DIN 2513/316L	2 0
Flange DN 150 PN 16 Form C, DIN 2501/316L	2 1
Flange DN 50 PN 40 EN1092-1 Form B1/316L	2 2
Flange DN 100 PN 160 GOST 12815-80.7/316L	2 3
Flange DN 80 PN 160 Form C, DIN 2501/316L	6 0
Flange DN 80 PN 250 Form L, DIN 2501/316L	6 1
Flange DN 50 PN 160, EN1092-1 Form B1/316L	6 2
Flange DN 50 PN 160, EN1092-1 Form B2/316L	6 3
Flange DN 50 PN 320, EN1092-1 Form B1/316L	6 4
Flange DN 65 PN 250, EN1092-1 Form B1/316L	6 5
Flange DN 100 PN 160, EN1092-1 Form B2/316L	6 6
Flange 2" 150 lb RF, ANSI B16.5/316L	3 0
Flange 2" 300 lb RF, ANSI B16.5/316L	3 1
Flange 2" 600 lb RF, ANSI B16.5/316L	3 2
Flange 2" 1 500 lb RF, ANSI B16.5/316L	3 3
Flange 3" 150 lb RF, ANSI B16.5/316L	3 4
Flange 3" 300 lb RF, ANSI B16.5/316L	3 5
Flange 3" 600 lb RF, ANSI B16.5/316L	3 6
Flange 3" 900 lb RF, ANSI B16.5/316L	3 7
Flange 3" 2 500 lb RF, ANSI B16.5/316L	3 8
Flange 3 ½" 600 lb RF, ANSI B16.5/316L	4 0
Flange 4" 150 lb RF, ANSI B16.5/316L	4 1
Flange 4" 300 lb RF, ANSI B16.5/316L	4 2
Flange 4" 600 lb RF, ANSI B16.5/316L	4 3
Flange 6" 150 lb RF, ANSI B16.5/316L	4 4
Flange 6" 300 lb RF, ANSI B16.5/316L	4 5
Flange 6" 600 lb RF, ANSI B16.5/316L	4 6
Flange 2" 150 lb Fisher special return/316L	4 7
Flange 2" 900 lb RF, ANSI B16.5/316L	5 0
Flange 3" 1 500 lb RF, ANSI B16.5/316L	5 1
Flange 4" 900 lb RF, ANSI B16.5/316L	5 2
Flange 4" 1 500 lb RF, ANSI B16.5/316L	5 3
Flange 4" 2 500 lb RJF, ANSI B16.5/316L	5 4

Selection and Ordering data	Article No.	Order Code	Selection and Ordering data	Article No.	Order Code
SITRANS LG270	7ML5883-		SITRANS LG270	7ML5883-	
A guided wave radar sensor for continuous level and interface measurement of liquids in aggressive applications			A guided wave radar sensor for continuous level and interface measurement of liquids in aggressive applications		
Electronics			Lengths		
Two-wire 4 ... 20mA/HART		0	<u>Rod ø16 mm/316L</u>		
Four-wire Modbus ²³⁾²⁴⁾²⁵⁾²⁶⁾		1	300 mm (11.81 inch) ¹⁵⁾		0
Two-wire 4...20mA/HART with SIL qualification ²¹⁾²²⁾		2	500 mm (19.69 inch) ¹⁵⁾		1
Four-wire 4...20mA/HART; 90...253V AC; 50/60Hz ¹⁾²⁾⁶⁾		3	501 ... 1 000 mm (19.72 ... 39.37 inch) ¹⁵⁾		2
Four-wire 4...20mA/HART; 9.6...48V DC; 20...42 V AC ¹⁾²⁾⁶⁾		4	1 001 ... 2 000 mm (39.41 ... 78.74 inch) ¹⁵⁾		3
PROFIBUS PA		5	2 001 ... 3 000 mm (78.78 ... 118.11 inch) ¹⁵⁾		4
Seal/Second line of defense/ Process temperature			3 001 ... 4 000 mm (118.15 ... 157.48 inch) ¹⁵⁾		5
Ceramic-graphite/with glass seal/ -196 ... +280 °C (-321 ... +536 °F)	A		4 001 ... 5 000 mm (157.52 ... 196.85 inch) ¹⁵⁾		6
Ceramic-graphite /with glass seal/ -196 ... +450 °C (-321 ... +842 °F)	B		5 001 ... 6 000 mm (196.89 ... 216.53 inch) ¹⁵⁾		7
Housing/Protection/Cable			<u>Cable lengths ø2 or 4 mm/316L</u>		
Plastic IP66/IP67 M20x1.5/blind stopper	A		501 ... 1 000 mm (19.72 ... 39.37 inch)		9 R 2 E
Plastic IP66/IP67 ½" NPT/blind stopper	B		1 000 ... 5 000 mm (39.37 ... 196.85 inch)		9 R 2 F
Aluminium/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	C		5 001 ... 10 000 mm (196.89 ... 393.70 inch)		9 R 2 G
Aluminium/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	D		10 001 ... 15 000 mm (393.74 ... 590.55 inch)		9 R 2 H
Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	E		15 001 ... 20 000 mm (590.59 ... 787.40 inch)		9 R 2 J
Aluminium double chamber/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	F		20 001 ... 25 000 mm (787.44 ... 984.25 inch)		9 R 2 K
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	L		25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)		9 R 2 L
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	M		30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)		9 R 2 M
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	N		35 001 ... 40 000 mm (1 377.99 ... 1 574.80 inch)		9 R 2 N
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	P		40 001 ... 45 000 mm (1 574.84 ... 1 771.65 inch)		9 R 2 P
Stainless steel double chamber/IP66/IP68 (0.2 bar) M20x1.5/blind stopper	Q		45 001 ... 50 000 mm (1 771.69 ... 1 968.50 inch)		9 R 2 Q
Stainless steel double chamber/IP66/IP68 (0.2 bar) ½" NPT/blind stopper	R		50 001 ... 55 000 mm (1 968.54 ... 2 165.35 inch)		9 R 2 R
Aluminium/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	S		55 001 ... 60 000 mm (2 165.39 ... 2 362.20 inch)		9 R 2 S
Aluminium double chamber/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	T		<u>Coax ø42.2 mm/316L</u>		
Stainless steel (precision casting) 316L/IP66/IP68 (0.2 bar) M20x1.5/Cable gland stainless steel	U		300 ... 1 000 mm (11.81 ... 39.37 inch) ¹⁵⁾		9 R 3 G
Stainless steel (electropolished) 316L/IP66/IP68 (0.2 bar) M20x1.5/cable gland stainless steel	V		1 001 ... 2 000 mm (39.41 ... 78.74 inch) ¹⁵⁾		9 R 3 H
Aluminium single chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated	W		2 001 ... 3 000 mm (78.78 ... 118.11 inch) ¹⁵⁾		9 R 3 J
Aluminium double chamber / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated	X		3 001 ... 4 000 mm (118.15 ... 157.48 inch) ¹⁵⁾		9 R 3 K
Stainless steel single chamber (precision casting) / IP66/IP68 (0.2 bar) M20x1.5 / Cable gland brass nickel-plated	Y		4 001 ... 5 000 mm (157.52 ... 196.85 inch) ¹⁵⁾		9 R 3 L
			5 001 ... 6 000 mm (196.89 ... 236.22 inch) ¹⁵⁾		9 R 3 M

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

Selection and Ordering data	Article No. Order Code	Selection and Ordering data	Order code
SITRANS LG270 A guided wave radar sensor for continuous level and interface measurement of liquids in aggressive applications	7ML5883- 	Further designs (optional) Please add "-Z" to Article No. and specify Order code(s).	
Further designs (mandatory) Please add "-Z" to Article No. and specify Order code(s).	Order Code	Enter the total insertion length in plain text description	Y01
Supplementary electronics Without	A00	Enter the total length of rigid part (cable version only, to a maximum of 100 mm)	Y02
Additional current output 4 ... 20 mA ¹⁾²⁷⁾	A01	Cleaning included certificate: oil, grease and silicone free	W01
Dimensions centering weight (diameter/height) Without	B00	Identification Label (measurement loop) stainless steel	Y17
ø40/30 mm	B01	Identification Label (measurement loop) Foil	Y18
ø45/30 mm (for 2 inch tubes)	B02	3.1 Certificate instrument ²⁰⁾	C12
ø75/30 mm (for 3 inch tubes)	B03	3.1 Certificate material (NACE0175) ²⁰⁾	D07
ø95/30 mm (for 4 inch tubes)	B04	3.1-Certificate instrument with test data ²⁰⁾	C25
ø1.57/1.18 inch (for 2 inch schedule 160)	B05	2.2-Certificate material ²⁰⁾	C15
ø1.77/ 1.18 inch (for 2 inch schedule 40/80)	B06	Quality/test plan ²⁰⁾	C26
ø2.95/1.18 inch (for 3 inch schedule 10/40)	B07	Dye penetration test + 3.1 certificate/instrument ²⁰⁾	C13
ø3.74/ 1.18 inch (for 4 inch schedule 80)	B08	X-ray test + 3.1 certificate/instrument ²⁰⁾	C14
Rod mounted Without Rod, applicable for coax or cable probe types only ⁸⁾	C00	Positive material identification test + 3.1 certificate/instrument ²⁰⁾	C16
Mounted	C01	Roughness test + 3.1 certificate/instrument ²⁰⁾	C18
Not mounted	C02	Pressure test + 3.1 certificate/instrument ²⁰⁾	C31
Local display interface Without	E00	Helium leak test + 3.1 certificate/instrument ²⁰⁾	C32
Mounted	E01	Ferrite measuring accuracy to DIN32514-1 + 3.1 certificate/instrument ²⁰⁾	C60
Laterally mounted ¹⁾	E02	Pressure test according to Norsok + 3.1 certificate/instrument ²⁰⁾	C61
Language of display German	L00	5 point calibration certificate + 3.1 certificate/instrument ²⁰⁾²⁹⁾	C62
English	L01	Additional Operating Instructions	Article No.
French	L02	German	
Dutch	L03	4 ... 20 mA/HART - two-wire	PBD-51041025
Italian	L04	4 ... 20 mA/HART - two-wire coax probe	PBD-51041026
Spanish	L05	4 ... 20 mA/HART - four-wire	PBD-51041027
Portuguese	L06	4 ... 20 mA/HART - four-wire coax probe	PBD-51041028
Russian	L07	Modbus	PBD-51041029
Chinese	L08	Modbus- Coax probe	PBD-51041030
Japanese	L09	PROFIBUS PA	PBD-51041031
Operating instructions German	M00	PROFIBUS PA, Coax probe	PBD-51041032
English	M01	English	
French	M02	4 ... 20 mA/HART - two-wire	PBD-51041062
Spanish	M03	4 ... 20 mA/HART - two-wire coax probe	PBD-51041063
		4 ... 20 mA/HART - four-wire	PBD-51041064
		4 ... 20 mA/HART - four-wire coax probe	PBD-51041065
		Modbus	PBD-51041066
		Modbus- coax probe	PBD-51041067
		PROFIBUS PA	PBD-51041068
		PROFIBUS PA, Coax probe	PBD-51041069

Selection and Ordering data	Article No.
French	
4 ... 20 mA/HART - two-wire	PBD-51041136
4 ... 20 mA/HART - two-wire coax probe	PBD-51041137
4 ... 20 mA/HART - four-wire	PBD-51041138
4 ... 20 mA/HART - four-wire coax probe	PBD-51041139
Modbus	PBD-51041140
Modbus- Coax probe	PBD-51041141
PROFIBUS PA	PBD-51041142
PROFIBUS PA, Coax probe	PBD-51041143
Spanish	
4 ... 20 mA/HART - two-wire	PBD-51041099
4 ... 20 mA/HART - two-wire coax probe	PBD-51041100
4 ... 20 mA/HART - four-wire	PBD-51041101
4 ... 20 mA/HART - four-wire coax probe	PBD-51041102
Modbus	PBD-51041103
Modbus- Coax probe	PBD-51041104
PROFIBUS PA	PBD-51041105
PROFIBUS PA, Coax probe	PBD-51041105
Accessories	
Sitrans LG, GWR sensor Display Module	A5E34143449
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch - see point level measurement section	
<ol style="list-style-type: none"> 1) Available with Housing/Protection/Cable options E, F, Q, R, and T 2) Available with Supplementary electronic option A00 and Indicating/adjustment modules E00, E01 3) Available with Supplementary electronics A01 4) Available with Centering weight option B00 only 5) Available with Centering weight options B01 ... B08 only 6) Available with Approval options 0A,0B,0J,0K,0N,0R,0S,1A,1C,1E,1F, and 1G 7) Available only with the same diameter probe lengths 8) Available with Version/Material options A, B, C, D, F, G 9) Available with Rod Mounted options C01 and C02 10) Available with Indicating/adjustment modules E00 and E01 11) Available with Housing/Protection Cable options C, D, L, M only 12) Version/Material Hastelloy C22, temperature is limited to 400 °C (752 °F) 13) Not available with Length R3G 14) Available with Housing/Protection Cable options E, F, Q, and R 15) Y02 only available with Cable options 16) Available with Housing protection options C, D, E,F,L, M,Q, and R 17) Not available with Housing/Protection/Cable options N, P, and V 18) Available with Electronic option 0 only 19) Not available with Version/Material options E, F, and G 20) Listed Certificates are not available with all configurations, please contact factory for more information 21) SIL electronics option 2 available with Approval options 0A, 0E, 0G, 0H, 0N, 0Q, 0R, 0S, 0T, 0U, 1C, 1D, 1F, 1H, 1M, 1N, 1P and 1R 22) Available with Supplementary electronic option A00, SIL electronics 23) Available with Approval options 0A, 0H, 0K, 0R, 0S, 0U, 1A, 1C, 1D, 1E, 1F, 1H, 1N, 1P and 1R 24) Modbus only available with two chamber housing options 25) Modbus not available with Supplementary electronic (only for HART) option 26) Modbus not available with lateral mount display option 27) Not available with Indicating/adjustment module E02 28) Available with Housing protection options D, F, M and R 29) Available with Version/Material A, B, C, D and E 	

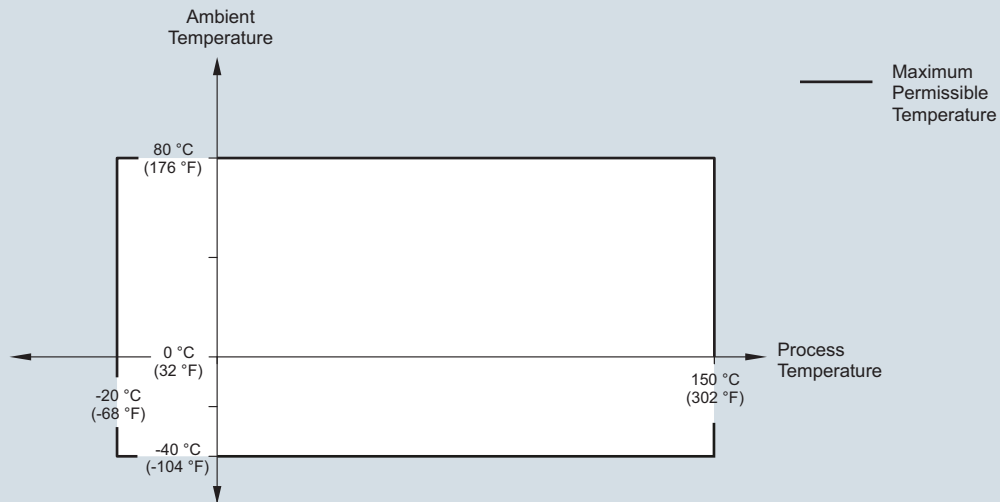
Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

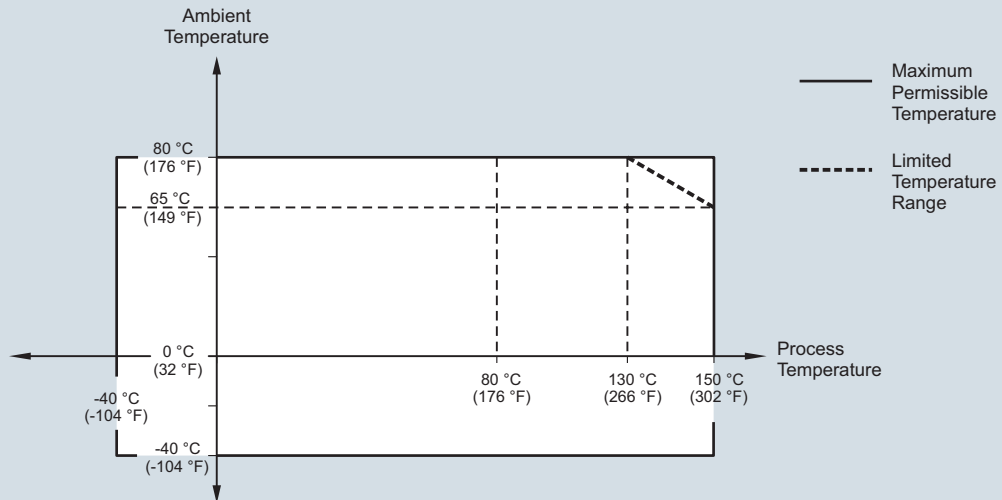
Characteristic curves

SITRANS LG240, Ambient temperature/process temperature, standard version

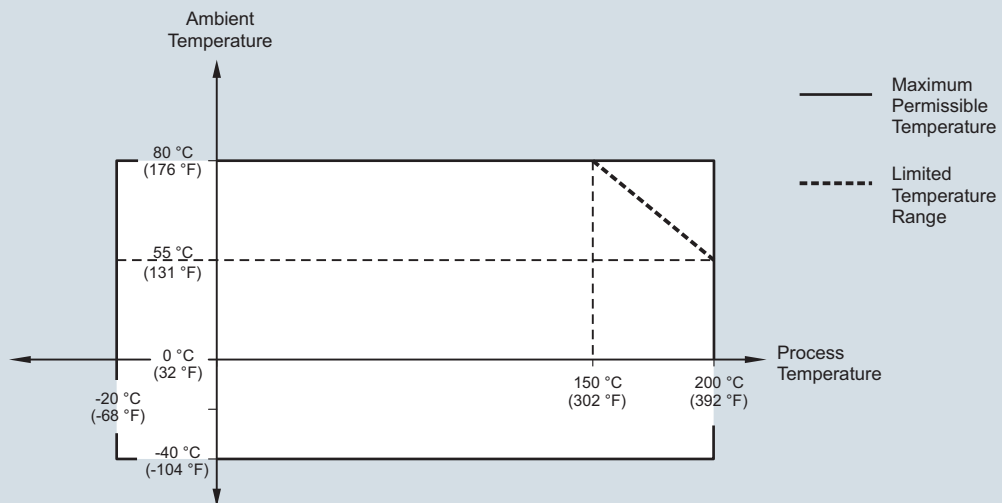


SITRANS LG240, Ambient temperature/process temperature curve

SITRANS LG250, Ambient temperature/process temperature, standard version



SITRANS LG250, Ambient temperature/process temperature, temperature adapter version



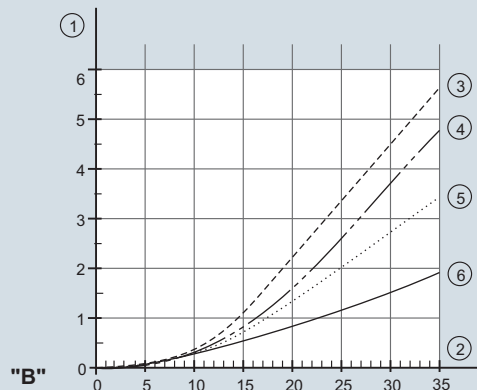
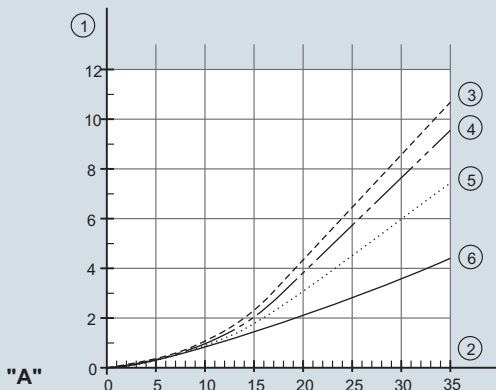
SITRANS LG250, Ambient temperature/process temperature curves

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

SITRANS LG260, Maximum tensile load with cereals and plastic granules - cable: \varnothing 4 mm (0.157 inch)



A. Cereals

B. Plastic granules

1. Tensile force in kN (the determined value must be multiplied with safety factor 2)

2. Cable length in m

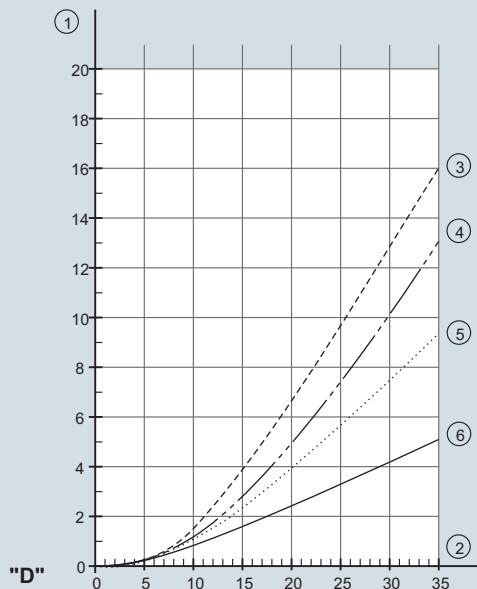
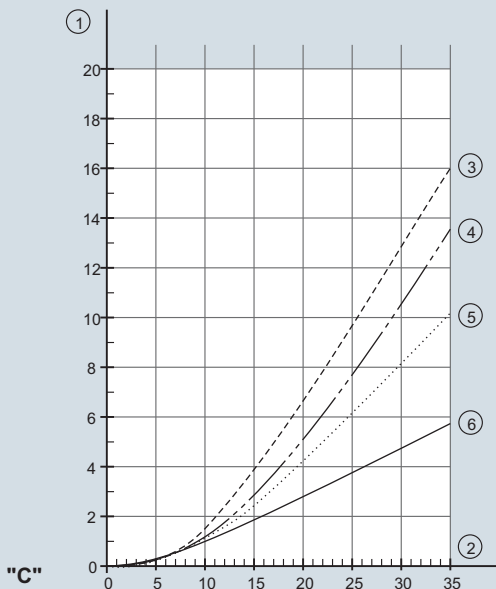
3. Vessel diameter 12 m (39.37 ft)

4. Vessel diameter 9 m (29.53 ft)

5. Vessel diameter 6 m (19.69 ft)

6. Vessel diameter 3 m (9.843 ft)

SITRANS LG260, Maximum tensile load with sand and cement - cable: \varnothing 4 mm (0.157 inch)



C. Sand

D. Cement

1. Tensile force in kN (the determined value must be multiplied with safety factor 2)

2. Cable length in m

3. Vessel diameter 12 m (39.37 ft)

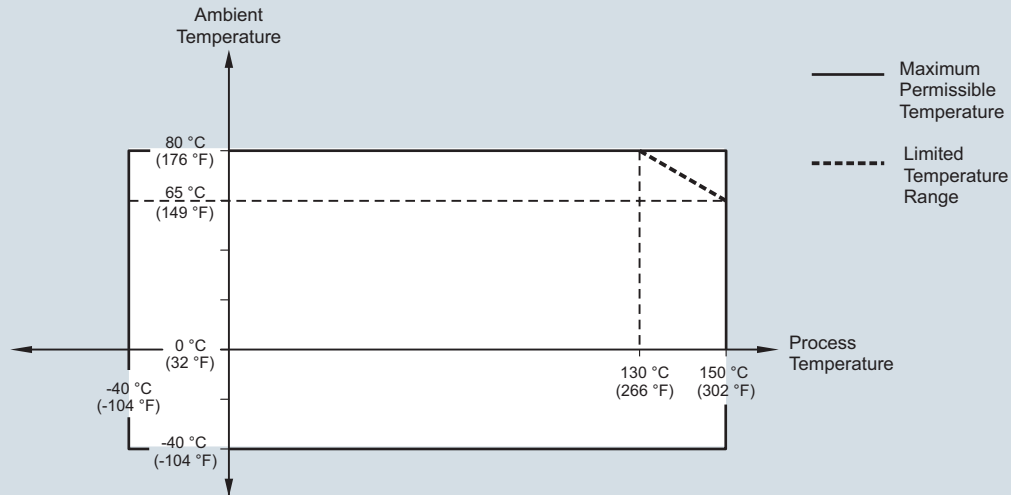
4. Vessel diameter 9 m (29.53 ft)

5. Vessel diameter 6 m (19.69 ft)

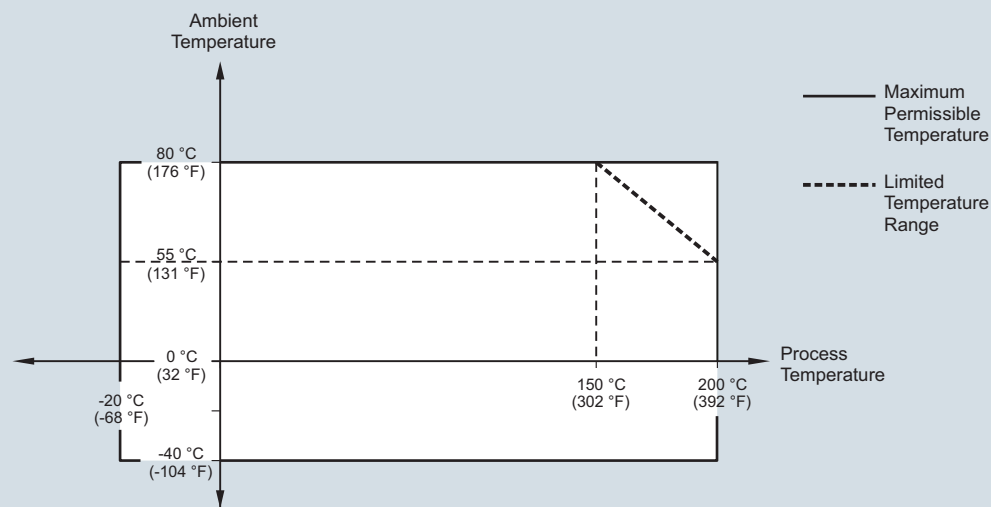
6. Vessel diameter 3 m (9.843 ft)

SITRANS LG260, Maximum tensile load curves

SITRANS LG260, Ambient temperature/process temperature, standard version
Cable version with \varnothing 4 mm (0.157 inch)
Cable version, PA coated with \varnothing 6 mm (0.236 inch)



SITRANS LG260, Ambient temperature/process temperature, temperature adapter version
Cable version with \varnothing 4 mm (0.157 inch)
Cable version, PA coated with \varnothing 6 mm (0.236 inch)



SITRANS LG260, Ambient temperature/process temperature curves

Level Measurement

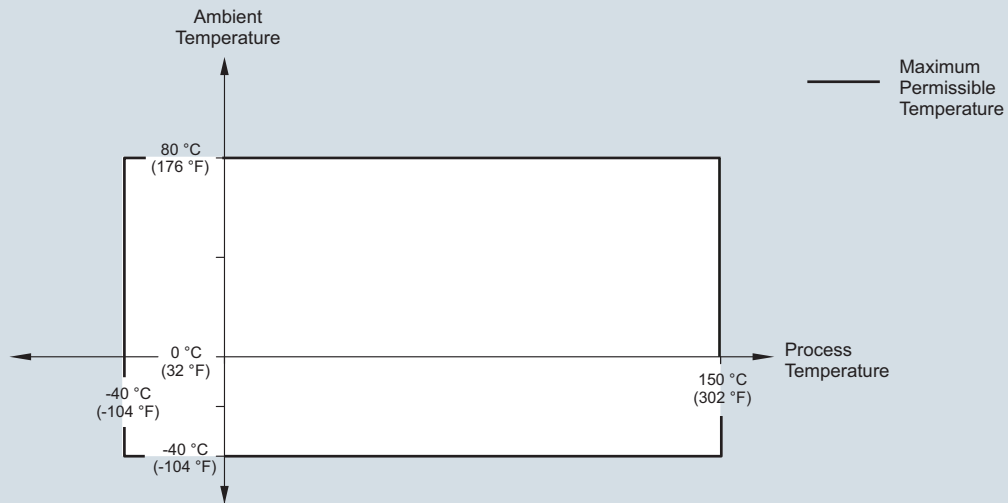
Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

SITRANS LG260, Ambient temperature/process temperature, standard version

Cable version with \varnothing 6 mm (0.236 inch)

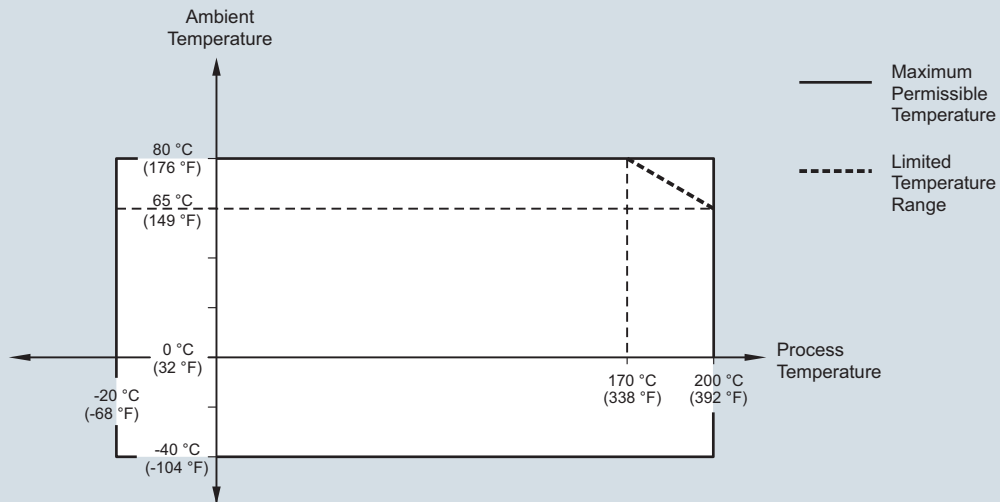
Cable version, PA coated with \varnothing 11 mm (0.433 inch)



SITRANS LG260, Ambient temperature/process temperature, temperature adapter version

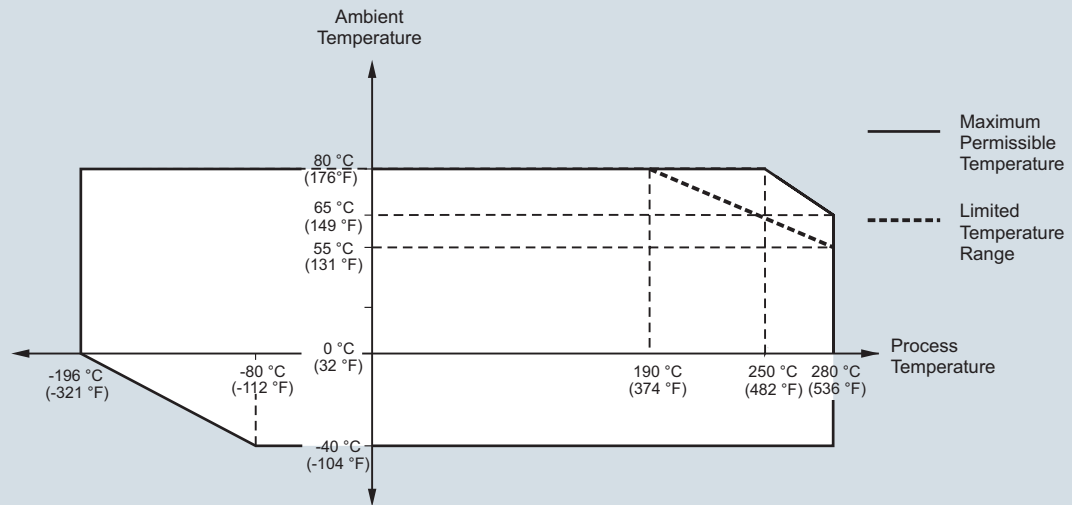
Cable version with \varnothing 6 mm (0.236 inch)

Cable version, PA coated with \varnothing 11 mm (0.433 inch)

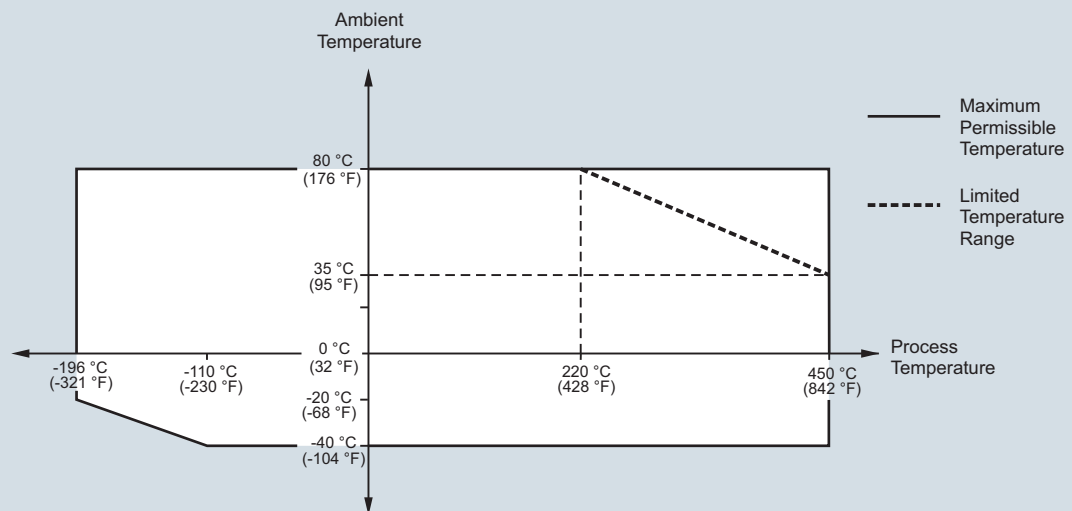


SITRANS LG260, Ambient temperature/process temperature curves

SITRANS LG270, Ambient temperature /process temperature (-196 ... +280 °C/-321 ... +536 °F version)



SITRANS LG270, Ambient temperature/process temperature (-196 ... +450 °C/-321 ... +842 °F version)



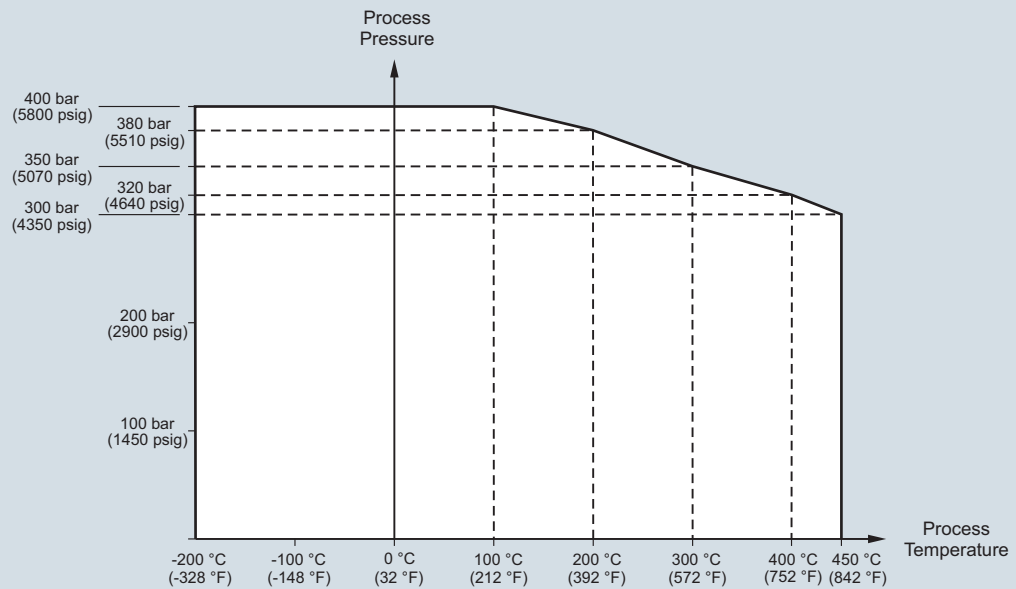
SITRANS LG270, Ambient temperature/process temperature curves

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

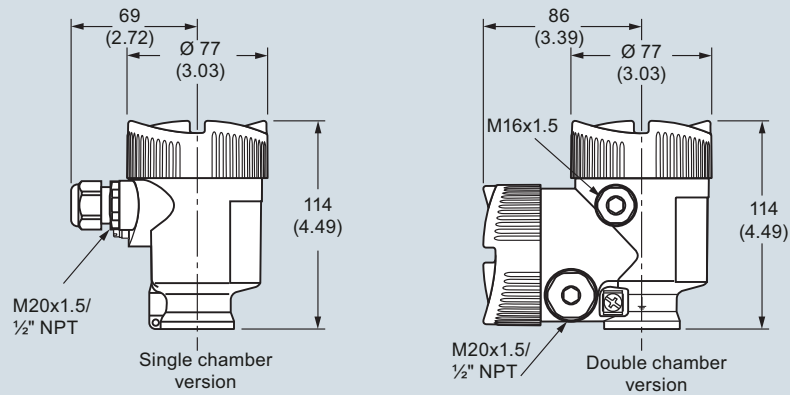
SITRANS LG270, Process pressure/process temperature (-196 ... +450 °C/-321 ... +842 °F version)



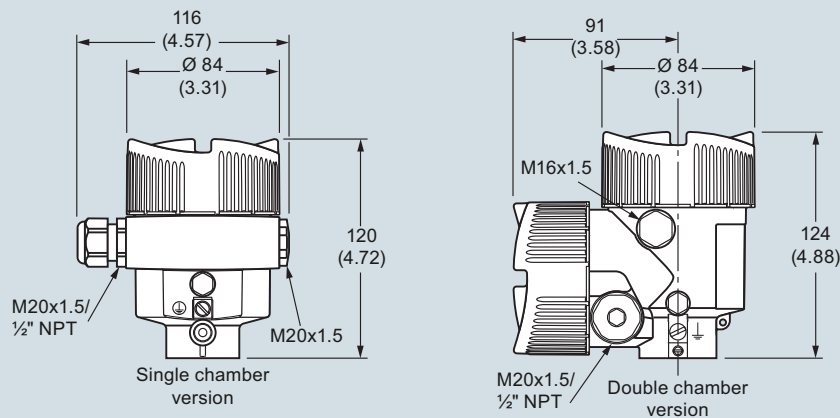
SITRANS LG270, Process pressure/process temperature curve

Dimensional drawings

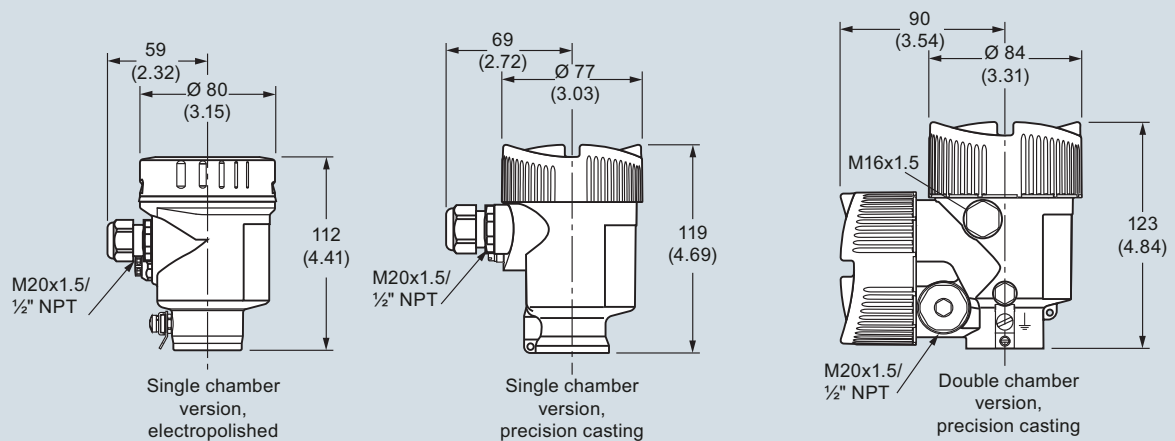
LG Series plastic housing



LG Series aluminum housing



LG Series stainless steel housing



Note: For integrated display and adjustment module the housing is 9 (0.35) higher for all housing options

SITRANS LG series, dimensions in mm (inch)

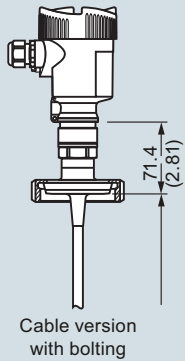
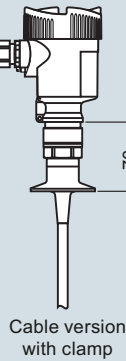
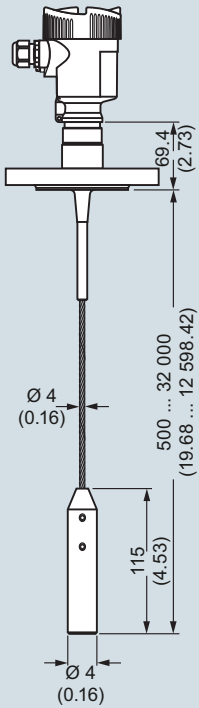
Level Measurement

Continuous level measurement - Guided wave radar transmitters

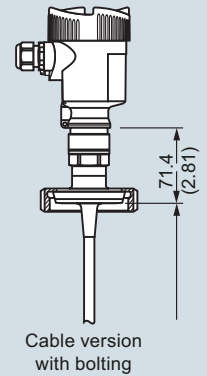
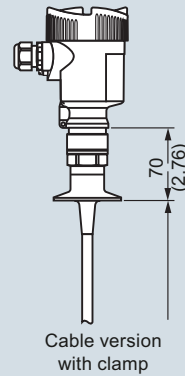
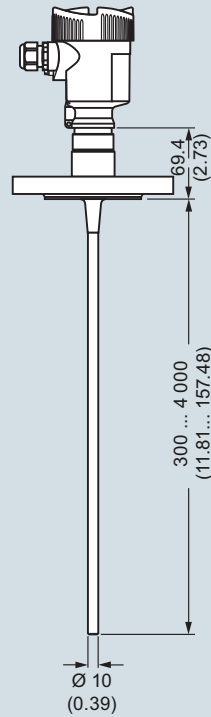
SITRANS LG series

SITRANS LG240

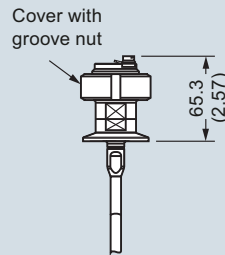
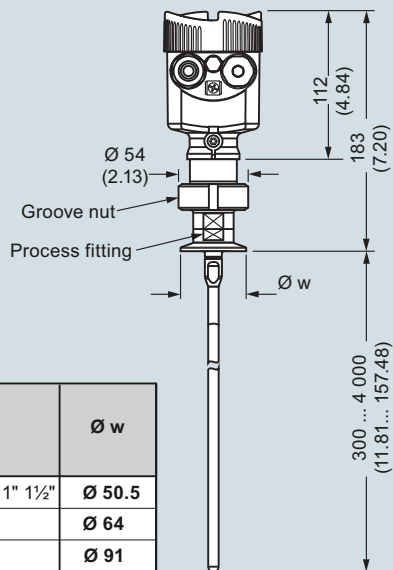
Cable version Ø 4 (0.157), PFA coated



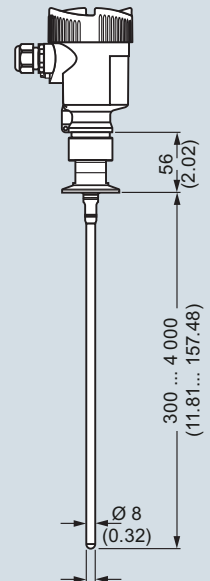
Rod version Ø 10 (0.394), PFA coated



Autoclaved version



Rod version Ø 8 (0.315), polished

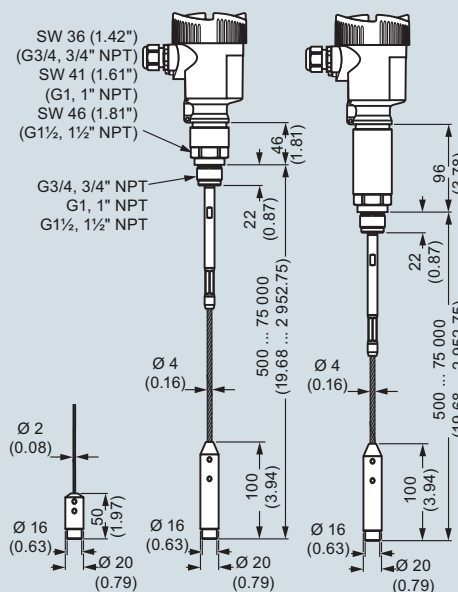


	Ø w
DIN DN 25 DN 32 DN 40/ 1" 1½"	Ø 50.5
DIN DN 50/ 2"	Ø 64
DIN DN 65/ 3"	Ø 91

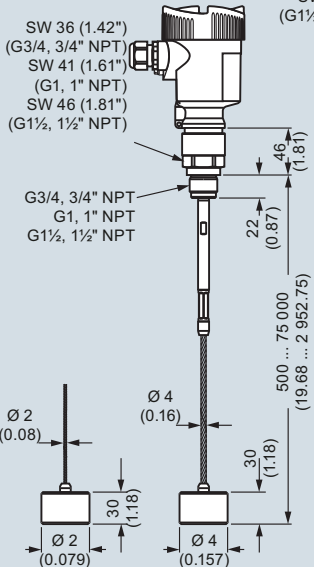
SITRANS LG240, dimensions in mm (inch)

SITRANS LG250

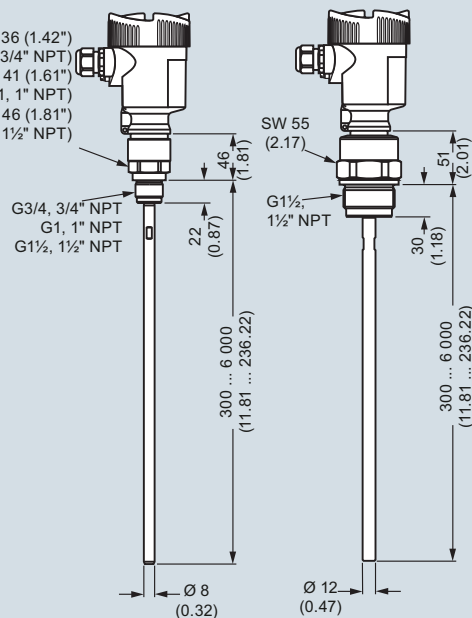
Cable version with gravity weight



Cable version with centering weight



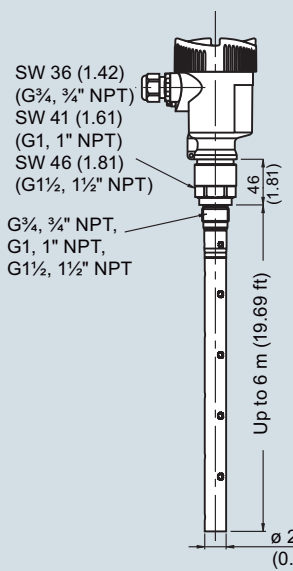
Rod version



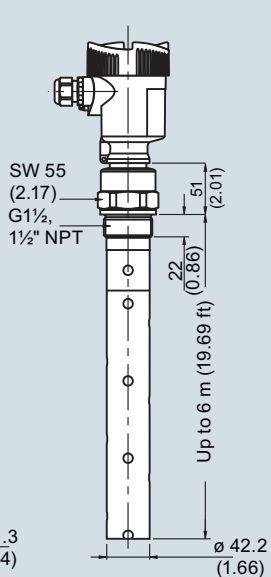
SITRANS LG250, dimensions in mm (inch)

SITRANS LG250, coax version

**Coaxial version
ø 21.3 (0.839)**



**Coaxial version
ø 42.2 (1.661)**



SITRANS LG250, dimensions in mm (inch)

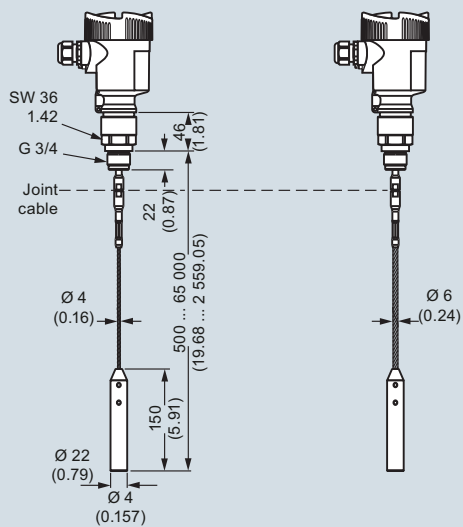
Level Measurement

Continuous level measurement - Guided wave radar transmitters

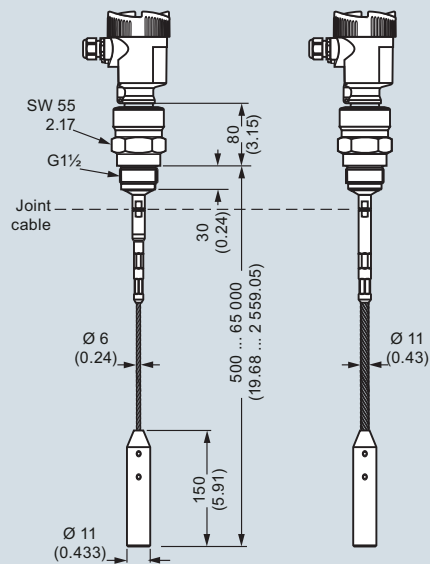
SITRANS LG series

SITRANS LG260

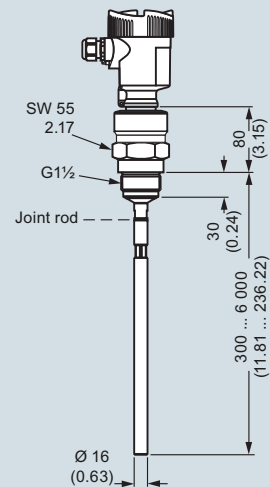
Cable version Ø 4 (0.157) / Ø 6 (0.236) - PA coated



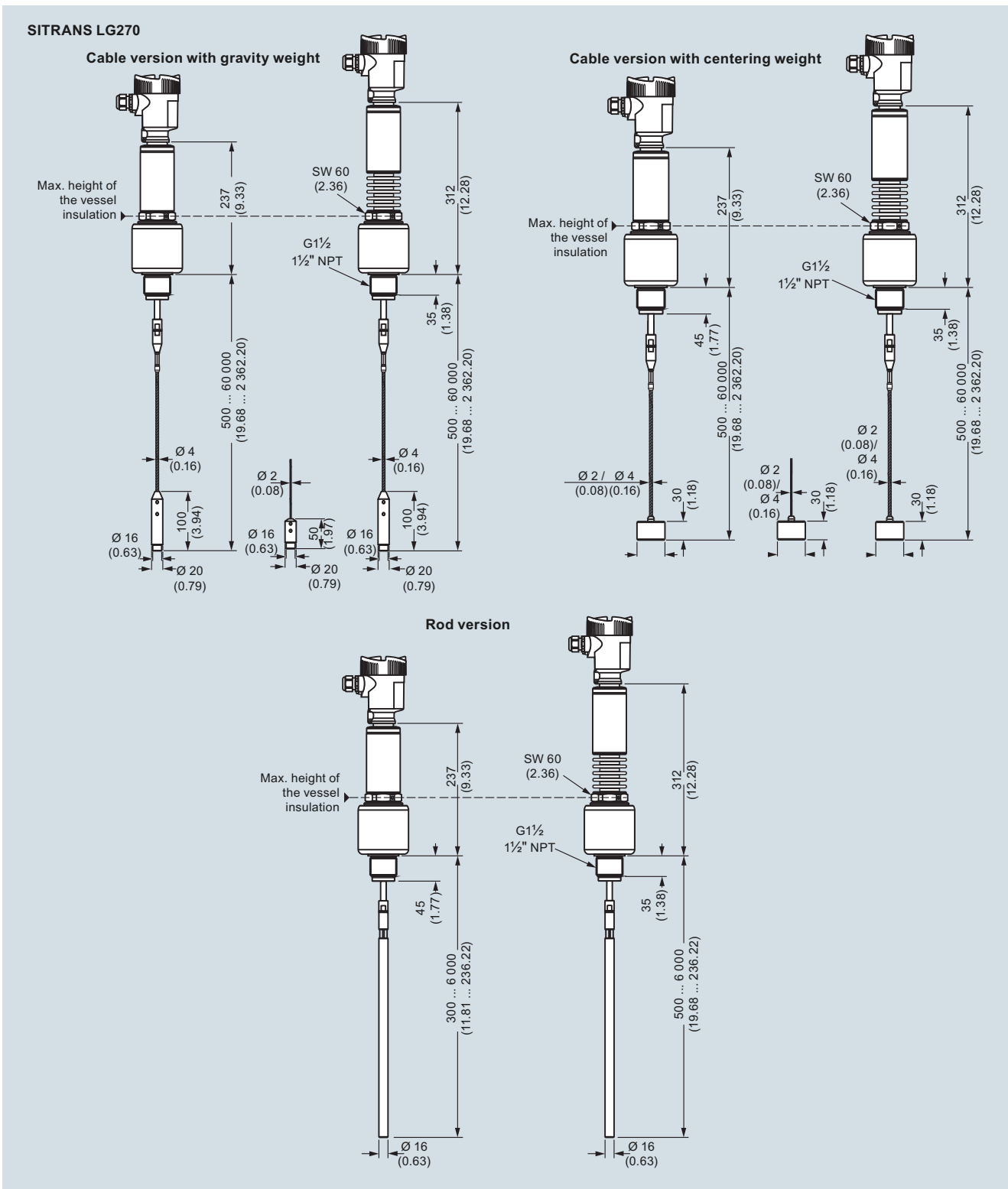
Cable version Ø 6 (0.236) / Ø 11 (0.433) - PA coated



Rod version Ø 16 (0.63)



SITRANS LG260, dimensions in mm (inch)



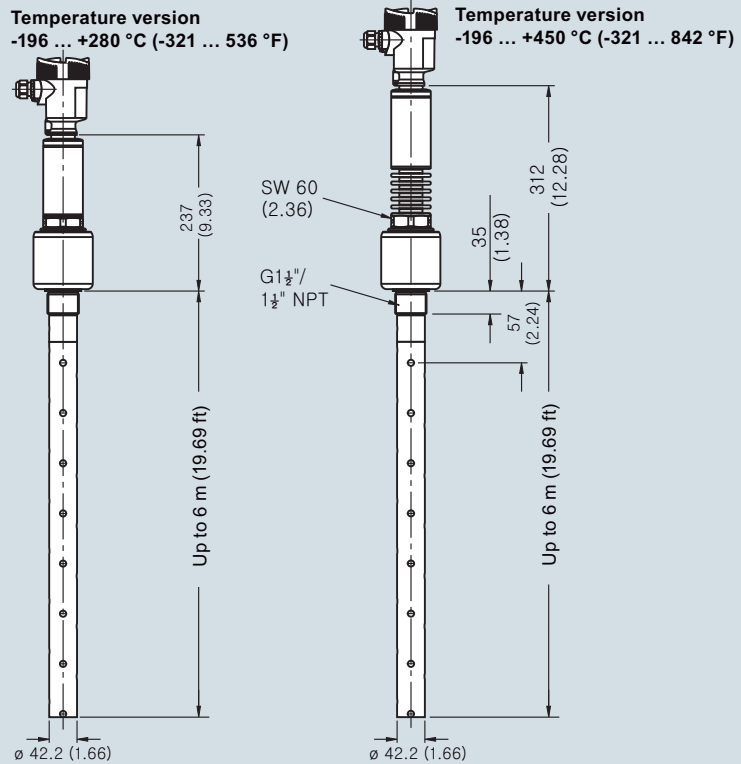
SITRANS LG270, dimensions in mm (inch)

Level Measurement

Continuous level measurement - Guided wave radar transmitters

SITRANS LG series

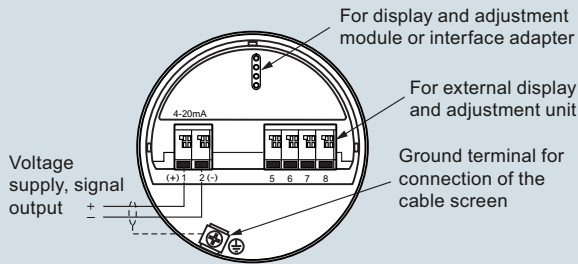
SITRANS LG270, coax version



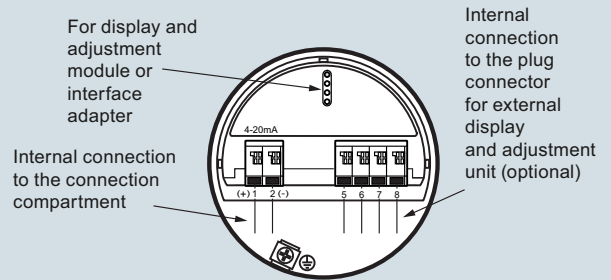
SITRANS LG270, dimensions in mm (inch)

Schematics

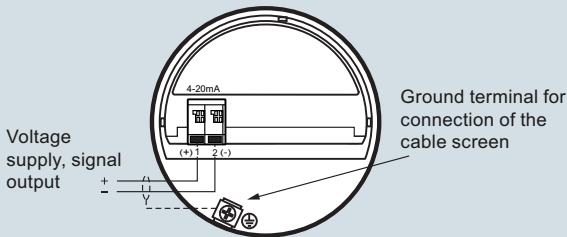
2-wire HART electronic option, electronics and connection compartment, single chamber housing



2-wire HART electronic option, electronics compartment, double chamber housing



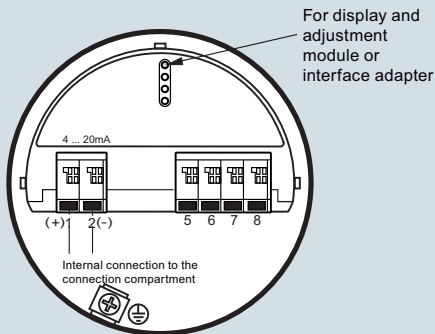
2-wire HART electronic option, connection compartment, Ex-d-ia double chamber housing



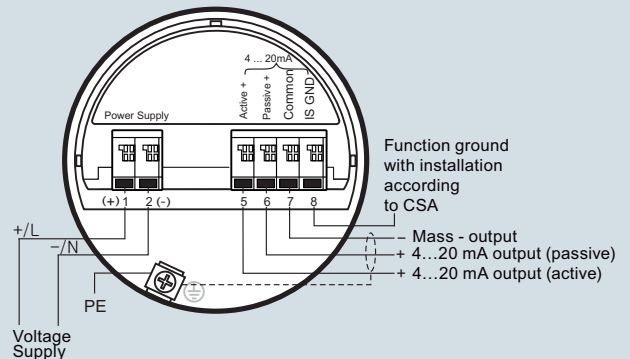
Note: All 2-wire HART connections and electronics are also available with SIL

SITRANS LG series, connections

4-wire HART electronic option, electronics compartment, double chamber housing



4-wire electronic option, connection compartment with double chamber housing with mains voltage



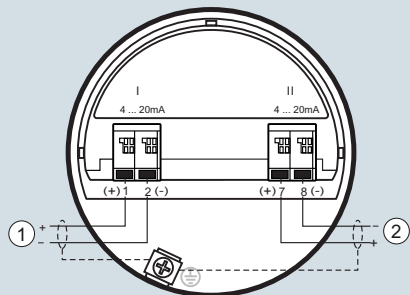
SITRANS LG series, connections

Level Measurement

Continuous level measurement - Guided wave radar transmitters

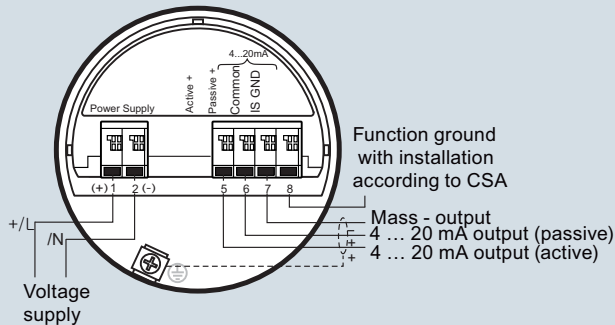
SITRANS LG series

Supplementary electronics



- ① First current output (I) - Voltage supply and signal output (HART)
- ② Second current output (II) - Voltage supply and signal output (without HART)

Connection compartment with low voltage



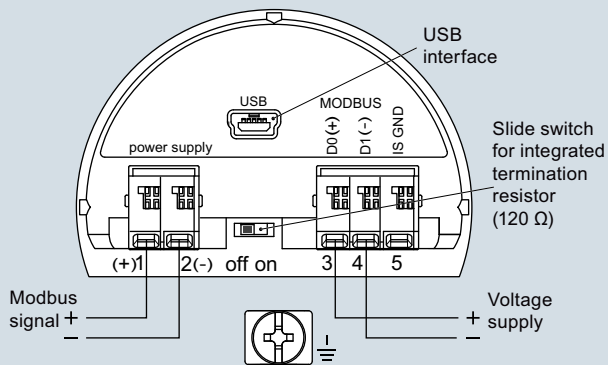
Function ground with installation according to CSA

Mass - output
4 ... 20 mA output (passive)
4 ... 20 mA output (active)

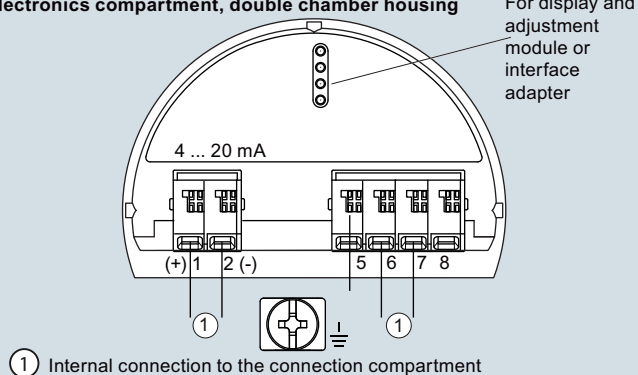
4

SITRANS LG series, connections

Modbus electronic option, connection compartment



Modbus electronic option, electronics compartment, double chamber housing

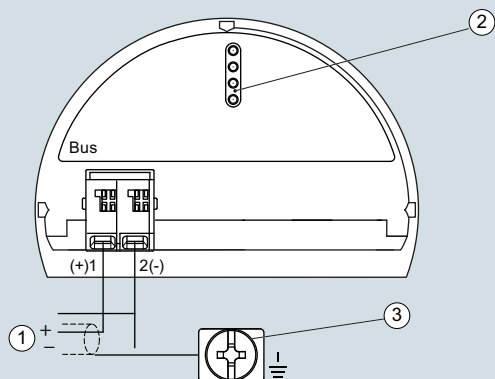


For display and adjustment module or interface adapter

- ① Internal connection to the connection compartment

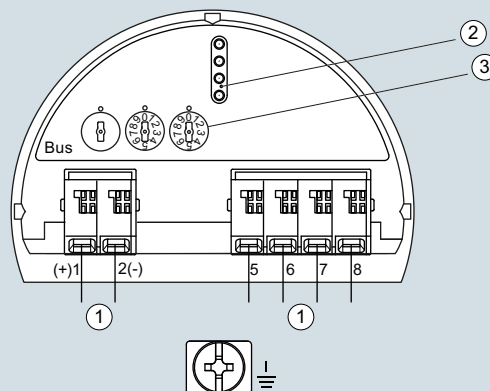
SITRANS LG series, connection

Profibus electronic option, connection compartment, double chamber housing



- ① Voltage supply, signal output
- ② For display and adjustment module or interface adapter
- ③ Ground terminal for connection of the cable screen

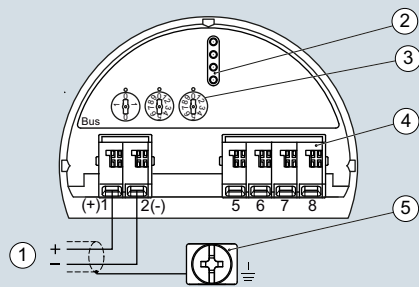
Profibus electronic option, electronics compartment, double chamber housing



- ① Internal connection to the connection compartment
- ② Contact pins for the display and adjustment module or interface adapter
- ③ Selection switch for bus address

LG series, connection

Profibus electronic option, electronics and connection compartment, single chamber housing



- ① Voltage supply, signal output
- ② For display and adjustment module or interface adapter
- ③ Selection switch for bus address
- ④ For external display and adjustment unit
- ⑤ Ground terminal for connection of the cable screen

LG series, connection

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

Overview



SITRANS LC300 is an inverse frequency shift capacitance continuous level transmitter for liquids and solids applications. It is ideal for standard industrial applications in chemical, hydrocarbon processing, food and beverage, water, wastewater, and mining, aggregate, and cement industries.

Benefits

- Patented Active-Shield technology so measurement is unaffected by material buildup in active shield section
- Highly accurate and reliable PFA-lined probes
- Integrated local LCD display
- 2-wire (4 to 20 mA) current loop design
- Current signaling according to NAMUR NE 43
- Push-button calibration and programming
- Stilling well (ground tube) version for low dielectric media and non-metallic vessels

Application

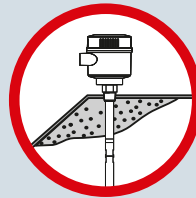
SITRANS LC300 is a 2-wire level measurement instrument combining a sophisticated, yet easy-to-adjust microprocessor with field-proven probes. It is available in four versions: rod, rod with stilling well, cable with PFA insulation, and cable without PFA insulation.

Materials with low or high dielectric properties are accurately measured and patented Active-Shield technology helps in ignoring the effects of buildup or condensation near vessel nozzle.

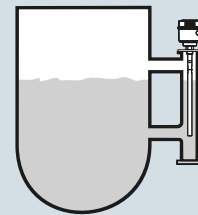
- Key Applications: Conductive and non-conductive media including: liquids and solids in standard industrial processes, bulk solids applications involving dust, and chemical processes involving vapor

Configuration

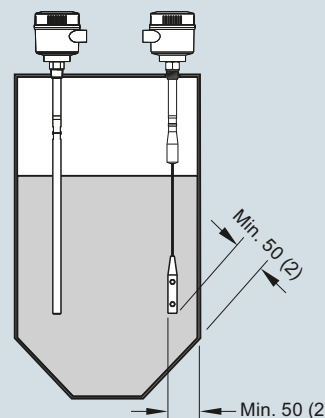
Installation



Build up of material in active shield area does not affect switch operation.



Mounting on a bypass



Install probe at least 50 (2) from tank wall.
Note angle of repose and adjust accordingly.

SITRANS LC300 installation, dimensions in mm (inch)

Technical specifications

Input	
Measuring range	1.66 ... 3 300 pF
Span	Min. 3.3 pF
Output	
Loop current	Continuous signal 4 ... 20 mA/ 20 ... 4 mA according to NAMUR 43
Accuracy (transmitter)	
Temperature stability	0.25 % of actual capacitance value
Non-linearity and repeatability	< 0.4 % of full scale and actual measurement value
Accuracy	Deviation < 0.5 % of actual measurement value
Rated operating conditions¹⁾	
Ambient conditions	
• Ambient temperature	-40 ... +85 °C (-40 ... +185 °F) ²⁾
• Installation category	I
• Pollution degree	4
• Ingress protection	Type 4/NEMA 4/IP65 (optional IP68)
Installation conditions	
• Location	Indoor/outdoor
Process pressure	-1 ... +35 bar g (-14.6 ... +511 psi g)
Process temperature	-40 ... +200 °C (-40 ... +392 °F) ³⁾
Min. dielectric constant ϵ_r	1.5
Design	
Material	
• Enclosure	Aluminum, epoxy-coated
Probe diameter	
• Rod version	19 mm (0.75 inch) with PFA jacket
• Cable version	9 mm (0.35 inch) with PFA jacket, 6 mm (0.24 inch) without PFA jacket
Active shield length	
• Rod version	Threaded: 120 mm (4.72 inch) Flanged: 100 mm (3.94 inch)
• Cable version	Threaded: 125 mm (4.92 inch) Flanged: 105 mm (4.13 inch)
Process connection of probe	
• Threaded rod mounting	$\frac{3}{4}$ ", 1", 1 $\frac{1}{4}$ ", 1 $\frac{1}{2}$ " NPT [(Taper), ANSI/ASME B1.20.1] R $\frac{3}{4}$ ", 1", 1 $\frac{1}{2}$ " [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G $\frac{3}{4}$ ", 1", 1 $\frac{1}{2}$ " [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]
• Threaded cable mounting	1 $\frac{1}{2}$ " NPT [(Taper), ANSI/ASME B1.20.1] R 1 $\frac{1}{2}$ " [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 1 $\frac{1}{2}$ " [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]
• Flange mounting	1 ... 4" ASME, DN 25 ... 100
Enclosure cable inlet	2 x $\frac{1}{2}$ " NPT or 2 x M20x1.5
Power supply	
	12 ... 30 V DC any polarity, 2-wire current loop circuit
User Interface	
Display	Local LCD, 4 digit, each 0 ... 9 and limited alpha characters

Safety	
Measurement current signaling	According to NAMUR NE 43, signal 3.8 ... 20.5 mA, fault \leq 3.6 or \geq 21 mA (22 mA)
Certificates and approvals	
General	CE, CSA _{US/C} , FM, RCM
Dust Ignition Proof (Intrinsically Safe probe circuit)	
• Canada/USA	FM/CSA: Class II, Div. 1, Groups E,F,G Class III T4
• Europe	ATEX 1/2 D T100 °C
Flame Proof (Intrinsically Safe probe circuit)	
• Europe	ATEX II 1/2 G EEx d [ia] IIC T6 ... T1 ATEX II 1/2 D T100 °C
Explosion Proof (Intrinsically Safe probe circuit)	
• Canada/USA	Class I, Div. 1, Groups A,B,C,D Class II, Div. 1, Groups E,F,G Class III T4
Marine	Bureau Veritas Type Approval ABS Type Approval
Overfill Protection	AIB-Vincotte
Other	Pattern Approval (China)

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate.
See also Pressure/Temperature curves on page 4/331.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F)

³⁾ Not suitable for steam environments

Design: Probe	Rod version	Stilling well version	Cable version
Length	Min. 300 mm (12 inch), max. 5 000 mm (197 inch)	Min. 300 mm (12 inch), max. 5 000 mm (197 inch)	Min. 1 000 mm (40 inch), max. 25 000 mm (984 inch)
Sensor wetted parts	PFA, 316L stainless steel	PFA, 316L stainless steel	316L stainless steel or 316L stainless steel with PFA insulation
O-ring seal material	FKM or FFKM	FKM or FFKM	FKM or FFKM
Thermal isolator	Optional	Optional	Optional
Options	N/A	N/A	Mounting eye for PFA insulated cable version

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

Selection and Ordering data	Article No.
SITRANS LC300, rod version	7ML5670-
An inverse frequency shift capacitance continuous level transmitter for liquids and solids applications.	0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process connection	
Threaded, 316L stainless steel	
¾" NPT [(Taper), ANSI/ASME B1.20.1]	0 A
1" NPT [(Taper), ANSI/ASME B1.20.1]	0 B
1¼" NPT [(Taper), ANSI/ASME B1.20.1]	0 C
1½" NPT [(Taper), ANSI/ASME B1.20.1]	0 D
R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 A
R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 B
R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]	1 D
G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 A
G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 B
G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	3 D
<u>Welded flange, 316L stainless steel, raised face¹⁾</u>	
1" ASME, 150 lb	5 A
1" ASME, 300 lb	5 B
1" ASME, 600 lb	5 C
1½" ASME, 150 lb	5 D
1½" ASME, 300 lb	5 E
1½" ASME, 600 lb	5 F
2" ASME, 150 lb	5 G
2" ASME, 300 lb	5 H
2" ASME, 600 lb	5 J
3" ASME, 150 lb	5 K
3" ASME, 300 lb	5 L
3" ASME, 600 lb	5 M
4" ASME, 150 lb	5 N
4" ASME, 300 lb	5 P
4" ASME, 600 lb	5 Q
<u>Welded flange, 316L stainless steel, Type A flat faced¹⁾</u>	
DN 25, PN 16	6 A
DN 25, PN 40	6 B
DN 40, PN 16	6 C
DN 40, PN 40	6 D
DN 50, PN 16	6 E
DN 50, PN 40	6 F
DN 80, PN 16	6 G
DN 80, PN 40	6 H
DN 100, PN 16	6 J
DN 100, PN 40	6 K
Probe Length (from flange face or including process thread)	
Add Order code Y01 and plain text: "Insertion length ... mm"	
300 ... 1 000 mm (11.81 ... 39.37 inch)	A
1 001 ... 2 000 mm (39.41 ... 78.74 inch)	B
2 001 ... 3 000 mm (78.78 ... 118.11 inch)	C
3 001 ... 4 000 mm (118.15 ... 157.48 inch)	D
4 001 ... 5 000 mm (157.52 ... 196.85 inch)	E
Thermal isolator	
Without thermal isolator	0
With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	1

Selection and Ordering data	Article No.
SITRANS LC300, rod version	7ML5670-
An inverse frequency shift capacitance continuous level transmitter for liquids and solids applications.	0
Wetted seals	
FKM	0
FFKM [for process temperatures above -20 °C (-4 °F)]	1
Probe material	
19 mm (0.75 inch) diameter 316L stainless steel, PFA lined rod	0
Approvals	
General Safety (CSA, FM, CE, RCM)	A
Dust Ignition Proof With IS Probe	B
CE, RCM, ATEX II 1/2 D T100 °C	C
Flame Proof Enclosure With IS Probe	D
CE, RCM, ATEX II 1/2 G EEx d [ia] IIC T6...T1, ATEX II 1/2 D T100 °C	E
Dust Ignition Proof With IS Probe	
CSA/FM Class II, Div. 1, Groups E, F, G	
CSA/FM Class III T4	
Explosion Proof Enclosure With IS Probe	
CSA/FM Class I, Div. 1, Groups A, B, C, D	
CSA/FM Class II, Div. 1, Groups E, F, G	
CSA/FM Class III T4	
Enclosure	
Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65	A
Aluminum epoxy coated 2 x M20 x 1.5 cable inlet, IP65	B
Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP68	C
Aluminum epoxy coated 2 x M20 x 1.5 cable inlet, IP68	D

¹⁾ Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Insertion length, specify in plain text: Y01: ... mm	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's Test Certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	
English	7ML1998-5HE03
French	7ML1998-5HE11
German	7ML1998-5HE33
Spanish	7ML1998-5HE21
Multi-language Quick Start manual Note: The Operating Instructions should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E32268590
Accessories	
Electronic transmitter kit (includes transmitter and driver)	7ML1830-1KN
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch - see point level measurement section	

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LC300, cable version An inverse frequency shift capacitance continuous level transmitter for non-conductive liquids and solids applications. Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5672- 0	SITRANS LC300, cable version An inverse frequency shift capacitance continuous level transmitter for non-conductive liquids and solids applications.	7ML5672- 0
Process connection Threaded, 316L stainless steel 1½" NPT [(Taper), ANSI/ASME B1.20.1] R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] <u>Welded flange, 316L stainless steel, raised face¹⁾</u> 1½" ASME, 150 lb 1½" ASME, 300 lb 1½" ASME, 600 lb 2" ASME, 150 lb 2" ASME, 300 lb 2" ASME, 600 lb 3" ASME, 150 lb 3" ASME, 300 lb 3" ASME, 600 lb 4" ASME, 150 lb 4" ASME, 300 lb 4" ASME, 600 lb <u>Welded flange, 316L stainless steel, Type A flat faced¹⁾</u> DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 DN 100, PN 16 DN 100, PN 40	0 D 1 D 3 D 5 D 5 E 5 F 5 G 5 H 5 J 5 K 5 L 5 M 5 N 5 P 5 Q 6 C 6 D 6 E 6 F 6 G 6 H 6 J 6 K	Approvals General Safety (CSA, FM, CE, RCM) Dust Ignition Proof With IS Probe CE, RCM, ATEX II 1/2 D T100 °C Flame Proof Enclosure With IS Probe CE, RCM, ATEX II 1/2 G EEx d [ia] IIC T6...T1, ATEX II 1/2 D T100 °C Dust Ignition Proof With IS Probe CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof Enclosure With IS Probe CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Enclosure Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 Aluminum epoxy coated 2 x M20 x 1.5 cable inlet, IP65 Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP68 Aluminum epoxy coated 2 x M20 x 1.5 cable inlet, IP68	A B C D E A B C D
Probe Length (from flange face or including process thread) <u>Add Order code Y01 and plain text:</u> <u>"Insertion length ... mm"</u> 1 000 ... 2 000 mm (39.37 ... 78.74 inch) 2 001 ... 4 000 mm (78.78 ... 157.48 inch) 4 001 ... 6 000 mm (157.52 ... 236.22 inch) 6 001 ... 8 000 mm (236.26 ... 314.96 inch) 8 001 ... 10 000 mm (315.00 ... 393.70 inch) 10 001 ... 12 000 mm (393.74 ... 472.44 inch) 12 001 ... 14 000 mm (472.48 ... 551.18 inch) 14 001 ... 16 000 mm (551.22 ... 629.92 inch) ²⁾ 16 001 ... 18 000 mm (629.96 ... 708.66 inch) ²⁾ 18 001 ... 20 000 mm (708.70 ... 787.40 inch) ²⁾ 20 001 ... 22 000 mm (787.44 ... 866.14 inch) ²⁾ 22 001 ... 24 000 mm (866.18 ... 944.88 inch) ²⁾ 24 001 ... 25 000 mm (944.92 ... 984.25 inch) ²⁾	A B C D E F G H J K L M N	¹⁾ Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard. ²⁾ Cable lengths from 15 000 mm (590.55 inch) to 25 000 mm (984.25 inch) can be used in non-conductive media. Contact Factory for assistance.	
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1		
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1		
Probe material Bare 316L stainless steel cable and 316L stainless steel cable weight, tinned copper crimp, PTFE backing ring, PEEK isolator and PFA lined active shield	0		

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Insertion length, specify in plain text: Y01: ... mm	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's Test Certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	
English	7ML1998-5HE03
French	7ML1998-5HE11
German	7ML1998-5HE33
Spanish	7ML1998-5HE21
Multi-language Quick Start manual Note: The Operating Instructions should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	7ML1998-5QH81
Accessories	
Electronic transmitter kit (includes transmitter and driver)	7ML1830-1KN
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch - see point level measurement section	

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS LC300, PFA coated cable version An inverse frequency shift capacitance continuous level transmitter for liquids and solids applications. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5673-	SITRANS LC300, PFA coated cable version An inverse frequency shift capacitance continuous level transmitter for liquids and solids applications.	7ML5673-
Process connection Threaded, 316L stainless steel 1½" NPT [(Taper), ANSI/ASME B1.20.1] R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] <u>Welded flange, 316L stainless steel, raised face¹⁾</u> 1½" ASME, 150 lb 1½" ASME, 300 lb 1½" ASME, 600 lb 2" ASME, 150 lb 2" ASME, 300 lb 2" ASME, 600 lb 3" ASME, 150 lb 3" ASME, 300 lb 3" ASME, 600 lb 4" ASME, 150 lb 4" ASME, 300 lb 4" ASME, 600 lb <u>Welded flange, 316L stainless steel, Type A flat faced¹⁾</u> DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 DN 100, PN 16 DN 100, PN 40	0 D 1 D 3 D 5 D 5 E 5 F 5 G 5 H 5 J 5 K 5 L 5 M 5 N 5 P 5 Q 6 C 6 D 6 E 6 F 6 G 6 H 6 J 6 K	Probe material PFA coated cable and 316L stainless steel cable weight, PEEK isolator and PFA lined active shield	1
		Approvals General Safety (CSA, FM, CE, RCM) Dust Ignition Proof With IS Probe CE, RCM, ATEX II 1/2 D T100 °C Flame Proof Enclosure With IS Probe CE, RCM, ATEX II 1/2 G EEx d [ia] IIC T6...T1, ATEX II 1/2 D T100 °C Dust Ignition Proof With IS Probe CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4 Explosion Proof Enclosure With IS Probe CSA/FM Class I, Div. 1, Groups A, B, C, D CSA/FM Class II, Div. 1, Groups E, F, G CSA/FM Class III T4	A B C D E
		Enclosure Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP65 Aluminum epoxy coated 2 x M20 x 1.5 cable inlet, IP65 Aluminum epoxy coated 2 x ½" NPT via adapter - cable inlet, IP68 Aluminum epoxy coated 2 x M20 x 1.5 cable inlet, IP68	A B C D
		Mounting eye Without Mounting eye With mounting eye	0 1
		¹⁾ Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 standard. ²⁾ Cable lengths from 15 000 mm (590.55 inch) to 25 000 mm (984.25 inch) can be used in non-conductive media. Contact Factory for assistance.	
Probe Length (from flange face or including process thread) Add Order code Y01 and plain text: <u>"Insertion length ... mm"</u> 1 000 ... 2 000 mm (39.37 ... 78.74 inch) 2 001 ... 4 000 mm (78.78 ... 157.48 inch) 4 001 ... 6 000 mm (157.52 ... 236.22 inch) 6 001 ... 8 000 mm (236.26 ... 314.96 inch) 8 001 ... 10 000 mm (315.00 ... 393.70 inch) 10 001 ... 12 000 mm (393.74 ... 472.44 inch) 12 001 ... 14 000 mm (472.48 ... 551.18 inch) 14 001 ... 16 000 mm (551.22 ... 629.92 inch) ²⁾ 16 001 ... 18 000 mm (629.96 ... 708.66 inch) ²⁾ 18 001 ... 20 000 mm (708.70 ... 787.40 inch) ²⁾ 20 001 ... 22 000 mm (787.44 ... 866.14 inch) ²⁾ 22 001 ... 24 000 mm (866.18 ... 944.88 inch) ²⁾ 24 001 ... 25 000 mm (944.92 ... 984.25 inch) ²⁾	A B C D E F G H J K L M N		
Thermal isolator Without thermal isolator With thermal isolator [for process connection temperatures over 85 °C (185 °F)]	0 1		
Wetted seals FKM FFKM [for process temperatures above -20 °C (-4 °F)]	0 1		

Level Measurement

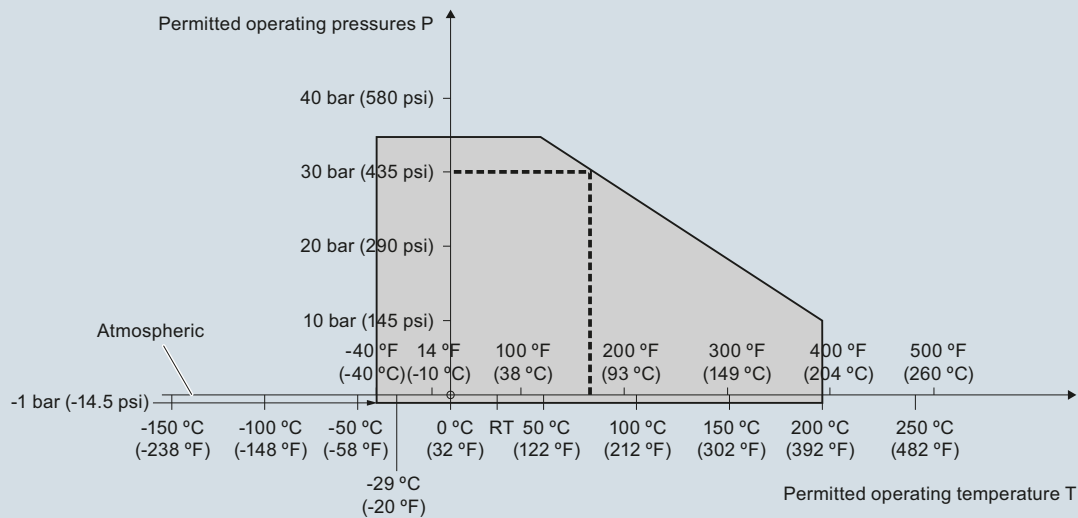
Continuous level measurement – Capacitance transmitters

SITRANS LC300

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Insertion length, specify in plain text: Y01: ... mm	Y01
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Manufacturer's Test Certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Operating Instructions	
English	7ML1998-5HE03
French	7ML1998-5HE11
German	7ML1998-5HE33
Spanish	7ML1998-5HE21
Multi-language Quick Start manual	7ML1998-5QH81
Note: The Operating Instructions should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	
Accessories	
Electronic transmitter kit (includes transmitter and driver)	7ML1830-1KN
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
For applicable back up point level switch - see point level measurement section	

Characteristic curves

Pressure/temperature curve
 LC300 standard, extended rod and cable probes
 Threaded process connections
 (7ML5670, 7ML5671, 7ML5672 and 7ML5673)



----- Example:
 ermitted operating pressure = 30 bar (435 psi) at 75 °C

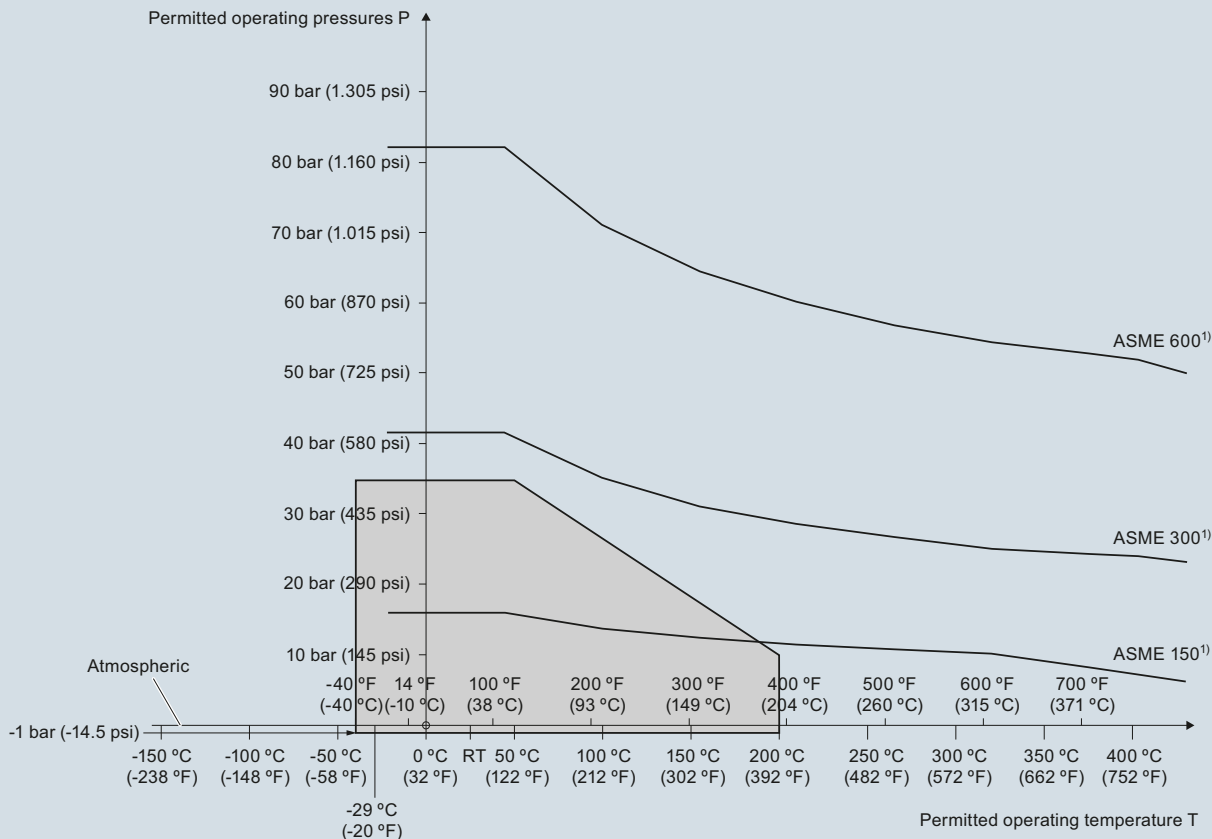
SITRANS LC300 Process Pressure/Temperature derating curves (7ML5625)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

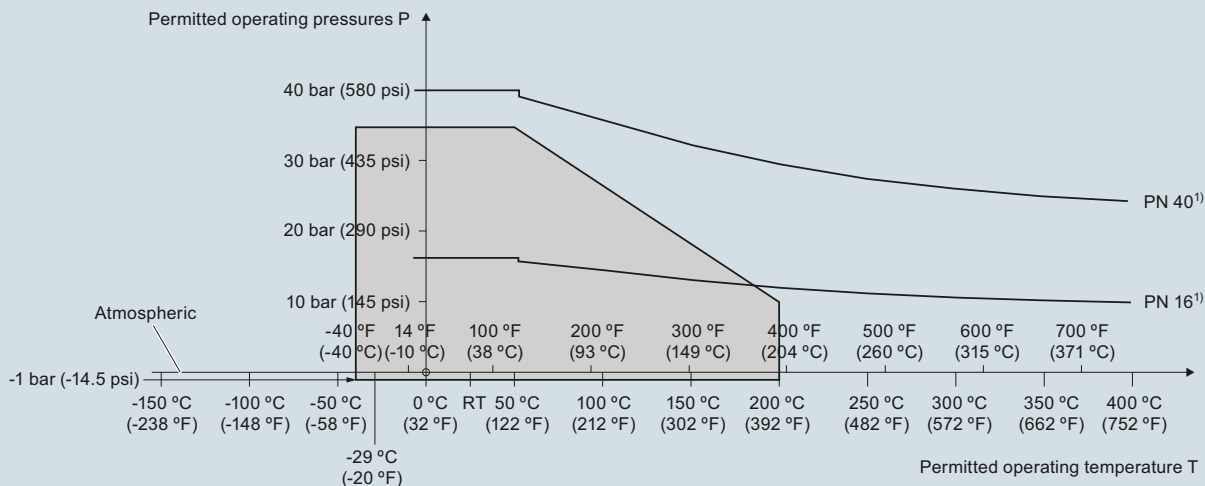
Pressure/temperature curve
LC300 standard, extended rod and cable probes
ASME flanged process connections
(7ML5670, 7ML5671, 7ML5672 and 7ML5673)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC300 Process Pressure/Temperature derating curves (7ML5626)

Pressure/temperature curve
LC300 standard, extended rod and cable probes
EN flanged process connections
(7ML5670, 7ML5671, 7ML5672 and 7ML5673)

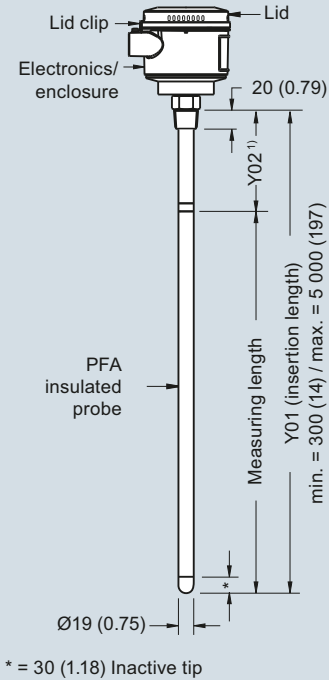


¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

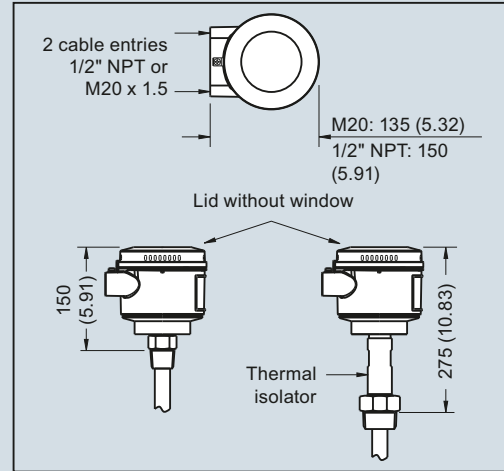
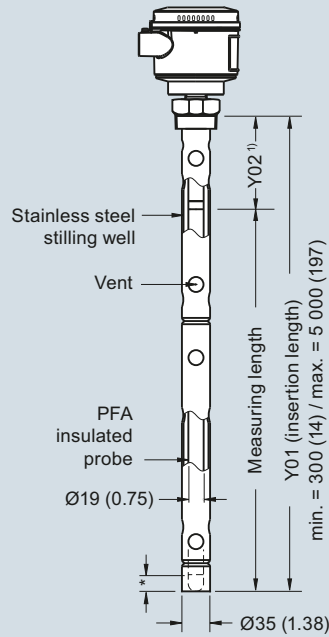
SITRANS LC300 Process Pressure/Temperature derating curves (7ML5626)

Dimensional drawings

Threaded (7ML5670)



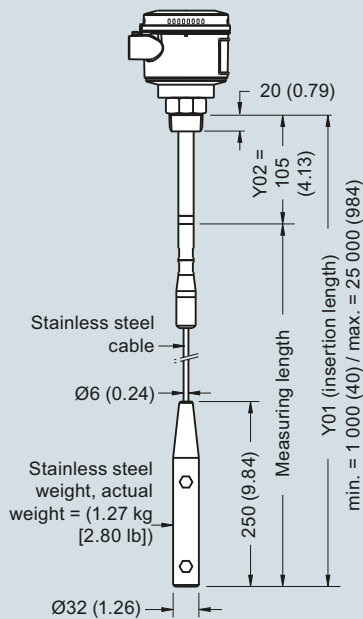
Threaded (7ML5671)



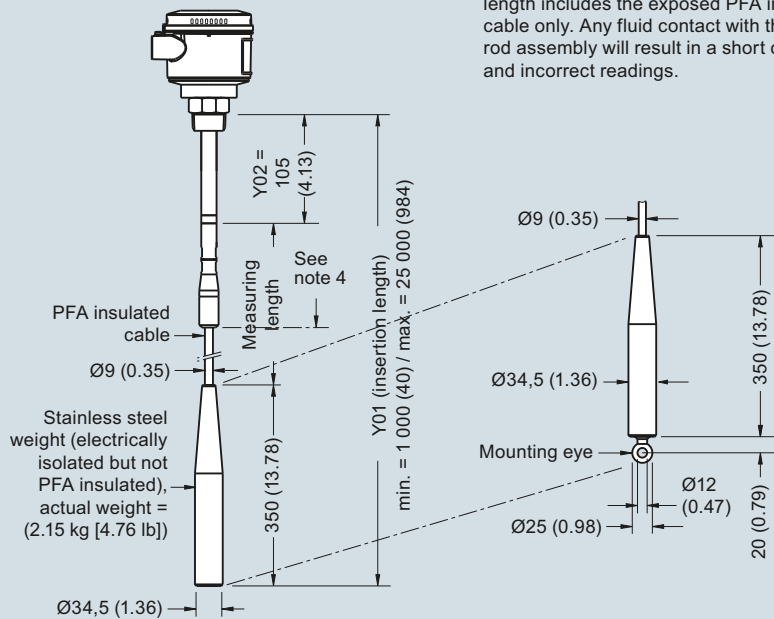
Note:

- 1) Rod version Y02: Shield length = 100 mm (3.9 inch) for threaded including process connection thread length, 100 mm (3.9 inch) for welded flange
- 2) For non-conductive applications only. Non-insulated cable can be shortened on site. Weight is included in measuring length.
- 3) For liquids and solids applications. Insulated cable cannot be shortened. Weight is **not** included in measuring length.
- 4) For conductive materials, the measuring length includes the exposed PFA insulated cable only. Any fluid contact with the upper rod assembly will result in a short circuit and incorrect readings.

Cable version, non-insulated ²⁾
Threaded (7ML5672)



Cable version, insulated ³⁾
Threaded (7ML5673)



SITRANS LC300 - Threaded Process Connections, dimensions in mm (inch)

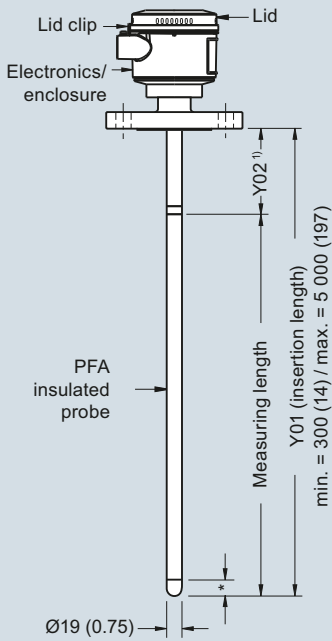
Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC300

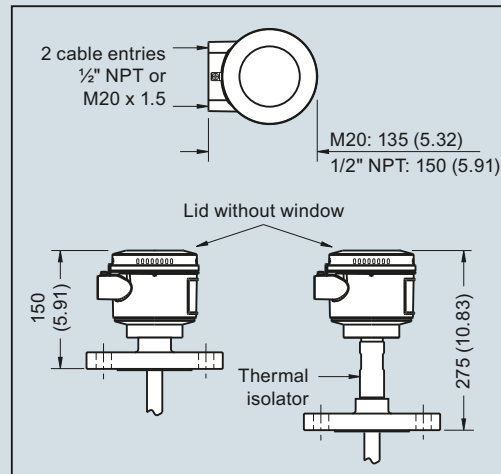
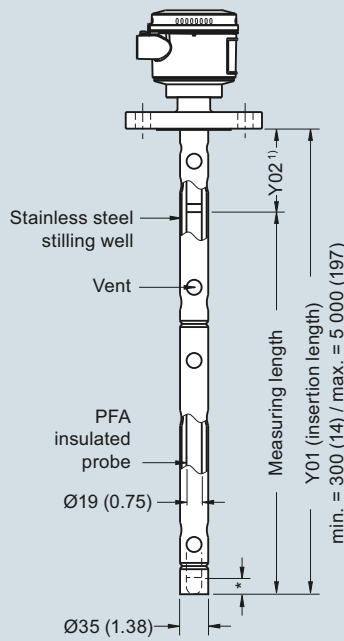
4

Welded Flange (7ML5670)



* = 30 (1.18) inactive tip

Welded Flange (7ML5671)



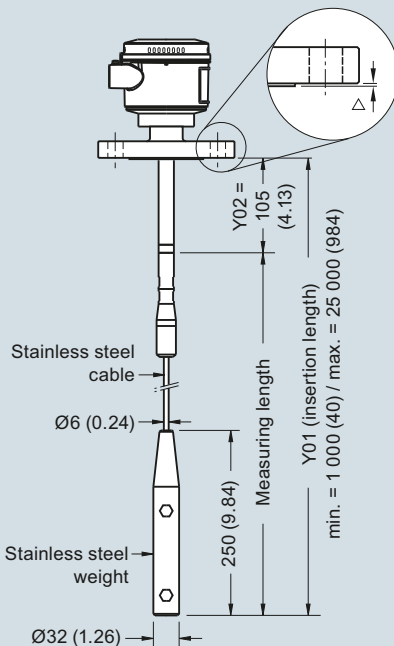
Flange Facing (raised face)

Flange Class	Facing thickness
△ ASME 150/300	2 (0.08)
△ ASME 600/900	7 (0.28)
△ PN16/40	2 (0.08)

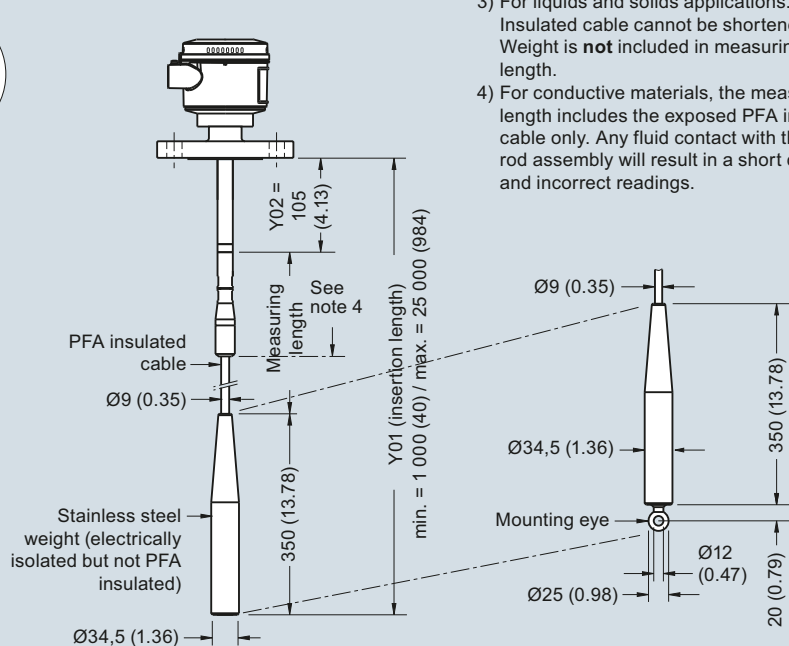
Notes:

- 1) Rod version Y02: Shield length = 100 mm (3.9 inch) for threaded including process connection thread length, 100 mm (3.9 inch) for welded flange.
- 2) For non-conductive applications only. Non-insulated cable can be shortened on site. Weight is included in measuring length.
- 3) For liquids and solids applications. Insulated cable cannot be shortened. Weight is **not** included in measuring length.
- 4) For conductive materials, the measuring length includes the exposed PFA insulated cable only. Any fluid contact with the upper rod assembly will result in a short circuit and incorrect readings.

Cable version, non-insulated²⁾
Welded Flange (7ML5672)

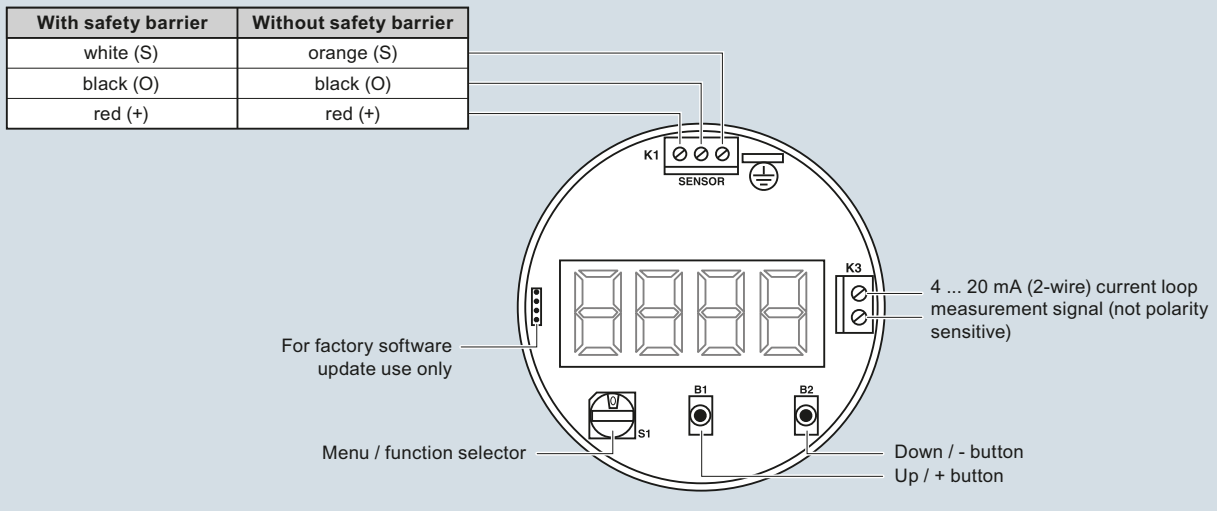


Cable version, insulated³⁾
Welded Flange (7ML5673)



SITRANS LC300 - Flanged Process Connections, dimensions in mm (inch)

Schematics



SITRANS LC300 connections

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Overview



SITRANS LC500 is an inverse frequency shift capacitance level or interface transmitter for extreme and critical process conditions, such as oil and liquified natural gas (LNG) as well as toxic and aggressive chemicals and vapors.

Benefits

- Patented Active-Shield technology so measurement is unaffected by material buildup in active shield section
- Simple push-button calibration and integrated local display
- Inverse frequency approach provides high resolution
- 2-wire loop powered 4 to 20/20 to 4 mA measurement signal
- Pre-detection alarm and full function diagnostics
- High temperature and pressure resistant (optional)
- Full-function diagnostics comply with NAMUR NE 43
- Easy calibration locally or via HART (using SIMATIC PDM software)

Application

SITRANS LC500's advanced electronics provide one-step, push-button calibration and local display for easy on-site installation and setup.

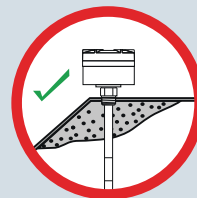
The unique mechanical probe design coupled with a high performance transmitter gives superior performance in toxic and aggressive chemicals, acids, caustics, adhesives and in viscous conductive and non-conductive materials.

The SMART 2-wire transmitter has HART communications for remote commissioning and inspection.

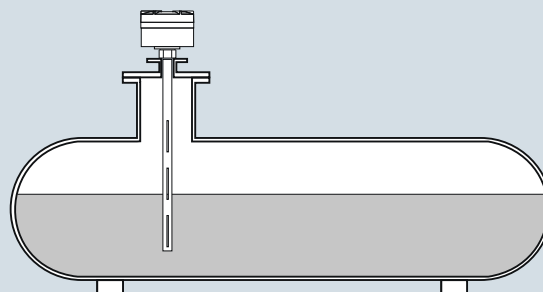
- Key Applications: Oil/water or foam/liquid interface measurement in separators or coalescers, cryogenic applications including CO₂ and liquified natural gas (LNG), distillation/regeneration tanks with high temperatures

Configuration

Installation



Build up of material or condensation in active shield area does not affect switch operation.



Mounting on non-linear vessels in non-conductive fluids using stilling well.

SITRANS LC500 installation, dimensions in mm (inch)

Technical specifications

Input	
Measuring range	1 ... 3 300 pF
Span	Min. 3.3 pF
Output	
Solid-state switch	
• Output	Galvanically isolated
• Protection	Bipolar
• Max. switching voltage	<ul style="list-style-type: none"> • 30 V (DC) • 30 V peak (AC)
• Max. load current	82 mA
• Voltage drop	< 1 V, typical at 50 mA
• Time delay (pre or post switching)	1 ... 60 s
Loop current	3.6 ... 22 mA/22 ... 3.6 mA (2-wire current loop)
Accuracy (transmitter)	
Temperature stability	0.15 pF (0 pF) or < 0.25 % (typically < 0.1 %) of actual measured value, whichever is greater over the full temperature range
Non-linearity and repeatability	< 0.1 % of range and actual measured value respectively
Accuracy	Deviation < 0.1 % of measured value

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Rated operating conditions¹⁾		Power supply	12 ... 33 V DC
Installation conditions		User Interface	
• Location	Indoor/outdoor	Display	Local LCD, 4 digit, each 0 ... 9 and limited alpha characters
Ambient conditions		Rotary function switch	For selecting programmable menu items
• Ambient temperature (transmitter)	-40 ... +85 °C (-40 ... +185 °F) ²⁾	Push buttons	Red +, blue -, used in conjunction with rotary switch for programming
• Installation category	II		
• Pollution degree	4	Features	
Medium conditions		Measurement current signaling	According to NAMUR NE 43, signal 3.8 ... 20.5 mA, fault ≤ 3.6 or ≥ 21 mA (22 mA)
• Relative dielectric constant ϵ_r	Min. 1.5	Safety	<ul style="list-style-type: none"> • Inputs/outputs fully galvanically isolated • Polarity-insensitive current loop • Fully potted • Integrated safety barrier
• Process temperature	Temperature rating of process seal is pressure dependent. See Pressure/Temperature curves on page 4/346.	Diagnostics with fault alarm when:	Primary variable (PV) out of limits, system failure in measurement circuit, deviation between A/D and D/A converter, check sum, watch dog and self-checking facility
- Standard (PFA) ³⁾	-50 ... +200 °C (-58 ... +392 °F)	Function rotary switch	Positions 0 ... 9, A ... F
- Cryogenic version	-200 ... +200 °C (-328 ... +392 °F)	SMART communication	Conforming to HART Communication Foundation (HCF)
• Process pressure	Pressure rating of process seal is temperature dependent. See Pressure/Temperature curves on page 4/346.		
• Standard (PFA)	-1 ... 150 bar g (2175 psi g)	Certificates and approvals	
Design		General Purpose	CE, CSA, FM, RCM
Material		Non-incendive/Non-sparking	<ul style="list-style-type: none"> • CSA/FM Class 1, Div. 2, Groups A, B, C, D T4 ATEX II 3G 2D EEx nA [ib] IIC • T6 ... T4 T100 °C
• Wetted parts material	316L stainless steel	Dust Ignition Proof (Intrinsically Safe Probe Circuit)	<ul style="list-style-type: none"> • CSA/FM Class II and III, Div. 1, Groups E, F, G • ATEX II 1/2 GD EEx d [ia] T6 to T1 T100 °C
- Standard rod	PFA	Explosion Proof (Intrinsically Safe Probe Circuit)	<ul style="list-style-type: none"> • FM Class 1, Div. 1, Groups A, B, C, D T4 • ATEX II 1/2 GD EEx d [ia] IIC T6 to T1
• Probe insulation (rod)	316 stainless steel/ 316 stainless steel PFA	Marine	Lloyds Register of Shipping, Categories ENV1, ENV2, ENV3 and ENV5, Bureau Veritas
• Cable	316 stainless steel/ 316 stainless steel PFA		
Probe diameter			
• Rod version	16 mm (0.63 inch) or 24 mm (0.95 inch)		
• Cable version	9 mm (0.35 inch) with PFA jacket, 6 mm (0.24 inch) without PFA jacket		
Active shield length			
• Minimum (rod version)	50 mm (1.97 inch), customer selectable (order number Y02)		
Probe length			
• Rod version	Max. 3.5 m (138 inch) with 16 mm rod, PFA Max. 5.5 m (216 inch) with 24 mm rod, PFA		
• Cable version	Max. 35 m (1 378 inch)		
Process connection of probe			
• Threaded mounting	NPT [(Taper), ANSI/ASME B1.20.1] R [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] G [(BSPP), EN ISO 228-1/ PF (JIS-P), JIS B 0202]		
• Flange mounting	ASME, EN 1092-1		
Enclosure			
• Material	Aluminum, epoxy-coated		
• Cable inlet	2 x ½ inch NPT (2 x M20x1.5, IP68 adapter, optional)		
• Degree of protection	Type 4X/NEMA4X/IP65, IP68		

¹⁾ When operation is in areas classified as hazardous, observe restrictions according to relevant certificate. See also Pressure/Temperature curves on page 4/346.

²⁾ Thermal isolator is used if process connection temperature exceeds 85 °C (185 °F).

³⁾ Not recommended for steam environments

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

SITRANS LC500 probe version	Standard		Extended Cable version with Rod Sensor
Process connection types	Threaded or welded flange	Single piece flanged	Threaded or welded flange
Threaded	Available as standard	–	Available as standard
Flange	Available as standard	Available as standard	Available as standard
Process connection materials			
Stainless steel 316L	Available as standard	Available as standard	Available as standard
Probe insulation			
PFA	Available as standard	Available as standard	Available as standard
Length and Process parameters¹⁾			
Rod length for PFA 16 mm version	Min. 200 mm (7.87 inch) Max. 3 500 mm (137.80 inch)	Min. 200 mm (7.87 inch) Max. 3 500 mm (137.80 inch)	Min. 200 mm (7.87 inch) Max. 3 500 mm (137.80 inch)
Rod length for PFA 24 mm version	Min. 200 mm (7.87 inch) Max. 5 500 mm (216.54 inch)	Min. 200 mm (7.87 inch) Max. 5 500 mm (216.54 inch)	Min. 200 mm (7.87 inch) Max. 5 500 mm (216.54 inch)
Cable length	Min. 1 000 mm (39.37 inch) Max. 35 000 mm (1 377.95 inch)	Min. 1 000 mm (39.37 inch) Max. 35 000 mm (1 377.95 inch)	Min. 5 000 mm (196.85 inch) ²⁾ Max. 35 000 mm (1 377.95 inch) ²⁾
Maximum process pressure	See Pressure/Temperature curves for specific probe type		5 bar g (73 psi g)
Maximum process temperature			100 °C (212 °F)

¹⁾ See Pressure/Temperature curves for specific probe type

²⁾ Refers to total insertion length. See dimension drawing on page 4/354 for further explanation - Not available as standard

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<p>SITRANS LC500, Threaded or Welded Flange with Cable Sensor</p> <p>Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.</p> <p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Version¹⁾ Cable, 9 mm (0.35 inch) diameter, 316 stainless steel with PFA insulation, weighted Add Order code Y01 and plain text: <u>"Insertion length ... mm"</u> 1 000 ... 2 000 mm (39.37 ... 78.74 inch) 2 001 ... 4 000 mm (78.78 ... 157.48 inch) 4 001 ... 6 000 mm (157.52 ... 236.22 inch) 6 001 ... 8 000 mm (236.26 ... 314.96 inch) 8 001 ... 10 000 mm (315 ... 393.70 inch) Longer lengths possible to a max. of 35 000 mm (114.83 ft). Contact ceg.smpi@siemens.com for details. Cable, 6 mm (0.24 inch) diameter, 316L stainless steel, non-insulated, weighted (non-conductive media only) Add Order code Y01 and plain text: <u>"Insertion length ... mm"</u> 1 000 ... 2 000 mm (39.37 ... 78.74 inch)²⁾ 2 001 ... 4 000 mm (78.78 ... 157.48 inch)²⁾³⁾ 4 001 ... 6 000 mm (157.52 ... 236.22 inch)²⁾³⁾ 6 001 ... 8 000 mm (236.26 ... 314.96 inch)²⁾³⁾ 8 001 ... 10 000 mm (315 ... 393.70 inch)²⁾³⁾ Cable lengths up to 25 000 mm (984.25 inch) are possible for non-conductive media. Cable lengths up to 15 000 mm (590.55 inch) are possible for conductive media. Contact ceg.smpi@siemens.com for details.</p> <p>Process connection (316L stainless steel) Threaded connection 1½" NPT [(Taper), ANSI/ASME B1.20.1] C 0 R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] F 0 1¼" NPT [(Taper), ANSI/ASME B1.20.1] K 0 G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] L 0 Welded flange, raised face 1½", ASME, 150 lb B 1 1½", ASME, 300 lb B 2 1½", ASME, 600 lb B 3 2", ASME, 150 lb C 1 2", ASME, 300 lb C 2 2", ASME, 600 lb C 3 3", ASME, 150 lb³⁾ D 1 3", ASME, 300 lb³⁾ D 2 3", ASME, 600 lb³⁾ D 3 4", ASME, 150 lb³⁾ E 1 4", ASME, 300 lb³⁾ E 2 4", ASME, 600 lb³⁾ E 3 6", ASME, 150 lb³⁾ F 1 6", ASME, 300 lb³⁾ F 2 6", ASME, 600 lb³⁾ F 3</p> <p>Welded flange, Type A flat faced DN 40, PN 16 K 4 DN 40, PN 40 K 5 DN 50, PN 16 L 4 DN 50, PN 40 L 5 DN 80, PN 16 M 4 DN 80, PN 40³⁾ M 5 DN 100, PN 16³⁾ N 4 DN 100, PN 40³⁾ N 5 DN 125, PN 16³⁾ P 4 DN 125, PN 40³⁾ P 5</p> <p>(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)</p>	<p>7ML5513-</p>	<p>SITRANS LC500, Threaded or Welded Flange with Cable Sensor</p> <p>Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.</p> <p>Approvals General Purpose: CE, CSA, FM, RCM CSA / FM Class I, Div. 2, Groups A, B, C, D CSA / FM Class II, III, Div. 1, Groups E, F, G T4 ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C FM Class I, Div.1, Groups A, B, C, D, T4</p> <p>Enclosure/Cable inlet Aluminum epoxy coated 2 x ½" NPT, IP68 2 x M20x1.5 (IP68, adapter)</p> <p>Options No additional options With mounting eye⁴⁾</p> <p>Thermal isolator Without thermal isolator Isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F)</p> <p>Electronic output 2-wire loop current 4 ... 20 mA (transmitter MSP 2002-2 _3300 pF)</p> <p>¹⁾ A minimum span of 3 pF must be maintained ²⁾ Available with non-conductive media only ³⁾ Custom shipping methods required. Contact factory for more details. ⁴⁾ Available in PFA insulated version only</p>	<p>7ML5513-</p>
		<p>Selection and Ordering data</p> <p>Further designs</p> <p>Please add "-Z" to Article No. and specify Order code(s).</p> <p>Insertion length, specify in plain text: Y01: ... mm Y01</p> <p>Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Y15</p> <p>Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 C11</p> <p>Inspection Certificate Type 3.1 per EN 10204 C12</p> <p>Operating Instructions See page 4/345</p> <p>Accessories See page 4/345</p>	<p>Order code</p>

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.
SITRANS LC500, Threaded or Welded Flange, with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours. ➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5515-
Version Rod, 16 mm (0.63 inch), PFA insulated Add Order code Y01 and Y02 and plain text: "Insertion length ... mm and active shield length ... mm" 200 ... 1 000 mm (7.87 ... 39.37 inch) ¹⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾ 3 001 ... 3 500 mm (118.15 ... 137.80 inch) ²⁾ Rod, 16 mm (0.63 inch), PFA insulated with 35 mm (1.38 inch) stilling well in 316L stainless steel Add Order code Y01 and Y02 and plain text: "Insertion length ... mm and active shield length ... mm" 200 ... 1 000 mm (7.87 ... 39.37 inch) ¹⁾³⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ³⁾ 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾³⁾ 3 001 ... 3 500 mm (118.15 ... 137.80 inch) ²⁾³⁾ Rod, 24 mm (0.94 inch), PFA insulated Add Order code Y01 and Y02 and plain text: "Insertion length ... mm and active shield length ... mm" 200 ... 1 000 mm (7.87 ... 39.37 inch) ⁴⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ⁴⁾ 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾⁴⁾ 3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²⁾⁴⁾ 4 001 ... 5 000 mm (173.26 ... 196.88 inch) ²⁾⁴⁾ 5 001 ... 5 500 mm (196.89 ... 216.54 inch) ²⁾⁴⁾ Rod, 24 mm (0.94 inch), PFA insulated with 48 mm (1.89 inch) stilling well in 316L stainless steel Add Order code Y01 and Y02 and plain text: "Insertion length ... mm and active shield length ... mm" 200 ... 1 000 mm (7.87 ... 39.37 inch) ⁵⁾ 1 001 ... 2 000 mm (39.41 ... 78.74 inch) ⁵⁾ 2 001 ... 3 000 mm (78.78 ... 118.11 inch) ²⁾⁵⁾ 3 001 ... 4 000 mm (118.15 ... 157.48 inch) ²⁾⁵⁾ 4 001 ... 5 000 mm (173.26 ... 196.88 inch) ²⁾⁵⁾ 5 001 ... 5 500 mm (196.89 ... 216.54 inch) ²⁾⁵⁾ Process connection (316L stainless steel) Threaded connection ¾" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1] 1½" NPT [(Taper), ANSI/ASME B1.20.1] 2" NPT [(Taper), ANSI/ASME B1.20.1] R ¾" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 1" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 1½" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] R 2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203] 1¼" NPT [(Taper), ANSI/ASME B1.20.1] G ¾" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 1" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 1½" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202] G 2" [(BSPP), EN ISO 228-1/PF (JIS-P), JIS B 0202]	0 A 1 A 2 A 3 A 0 B 1 B 2 B 3 B 0 C 1 C 2 C 3 C 4 C 5 C 0 D 1 D 2 D 3 D 4 D 5 D A 0 B 0 C 0 D 0 E 0 F 0 J 0 K 0 N 0 P 0 R 0 S 0 T 0

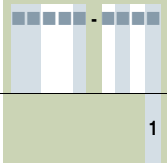
Selection and Ordering data	Article No.
SITRANS LC500, Threaded or Welded Flange, with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours. Welded flange, raised face 1½", ASME, 150 lb 1½", ASME, 300 lb 1½", ASME, 600 lb 2", ASME, 150 lb 2", ASME, 300 lb 2", ASME, 600 lb 3", ASME, 150 lb ²⁾ 3", ASME, 300 lb ²⁾ 3", ASME, 600 lb ²⁾ 4", ASME, 150 lb ²⁾ 4", ASME, 300 lb ²⁾ 4", ASME, 600 lb ²⁾ 6", ASME, 150 lb ²⁾ 6", ASME, 300 lb ²⁾ 6", ASME, 600 lb ²⁾ Welded flange, Type A flat faced DN 40, PN 16 DN 40, PN 40 DN 50, PN 16 DN 50, PN 40 DN 80, PN 16 DN 80, PN 40 ²⁾ DN 100, PN 16 ²⁾ DN 100, PN 40 ²⁾ DN 125, PN 16 ²⁾ DN 125, PN 40 ²⁾ (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)	B 1 B 2 B 3 C 1 C 2 C 3 D 1 D 2 D 3 E 1 E 2 E 3 F 1 F 2 F 3 K 4 K 5 L 4 L 5 M 4 M 5 N 4 N 5 P 4 P 5
Approvals General Purpose: CE, CSA, FM, RCM CSA / FM Class I, Div. 2, Groups A, B, C, D CSA / FM Class II, III, Div. 1, Groups E, F, G T4 ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C FM Class I, Div.1, Groups A, B, C, D, T4	1 2 4 6
Enclosure/Cable inlet Aluminum epoxy coated 2 x ½" NPT, IP68 2 x M20 x1.5 (IP68, adapter)	1 2
Options No additional options Slotted holes instead of standard vent holes in stilling well (refer to Operating Instructions for dimensions.) ⁶⁾	A B
Thermal isolator/remote version Without thermal isolator or remote electronics Thermal isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F) Remote electronics with mounting bracket and cable ⁷⁾ • Length: 2 m (79 inch) • Length: 3 m (118 inch) • Length: 4 m (158 inch) • Length: 5 m (197 inch)	A B C D E F

4

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LC500, Threaded or Welded Flange, with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	7ML5515- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Insertion length, specify in plain text: Y01: ... mm Active shield length, specify in plain text [min. length is 50 mm (2 inch)]: Y02: ... mm Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204 Manufacturing Test Report (Electrode Test)	 Y01 Y02 Y15 C11 C12 C18
Electronic output 2-wire loop current 4 ... 20 mA (transmitter MSP 2002-2_3300 pF)	1	Operating Instructions Accessories	See page 4/345 See page 4/345
1) A minimum span of 3 pF must be maintained 2) Custom shipping methods required. Contact factory for more details. 3) Available with process connection 1½" or larger 4) Available with process connection 1" or larger 5) Available with process connection 2" or larger 6) Available with version 0B ... 3B, 0D ... 5D and 0F only 7) Available with approval option 1 only			

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data

Article No.

SITRANS LC500, Single Piece Flanged with Rod Sensor

Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Version

Rod, 16 mm (0.63 inch), PFA insulated
Add Order code Y01 and Y02 and plain text:

"Insertion length ... mm and active shield length ... mm"

250 ... 1 000 mm (9.84 ... 39.37 inch)¹⁾

1 001 ... 2 000 mm (39.41 ... 78.74 inch)

2 001 ... 3 000 mm (78.78 ... 118.11 inch)²⁾

3 001 ... 3 500 mm (118.15 ... 137.80 inch)²⁾

0 A
1 A
2 A
3 A

Rod, 16 mm (0.63 inch), PFA insulated with 35 mm (1.34 inch) stilling well in 316L stainless steel

Add Order code Y01 and Y02 and plain text:

"Insertion length ... mm and active shield length ... mm"

250 ... 1 000 mm (9.84 ... 39.37 inch)

1 001 ... 2 000 mm (39.41 ... 78.74 inch)

2 001 ... 3 000 mm (78.78 ... 118.11 inch)²⁾

3 001 ... 3 500 mm (118.15 ... 137.80 inch)²⁾

0 B
1 B
2 B
3 B

Rod, 24 mm (0.94 inch), PFA insulated
Add Order code Y01 and Y02 and plain text:

"Insertion length ... mm and active shield length ... mm"

250 ... 1 000 mm (9.84 ... 39.37 inch)

1 001 ... 2 000 mm (39.41 ... 78.74 inch)

2 001 ... 3 000 mm (78.78 ... 118.11 inch)²⁾

3 001 ... 4 000 mm (118.15 ... 157.48 inch)²⁾

4 001 ... 5 000 mm (173.26 ... 196.88 inch)²⁾

5 001 ... 5 500 mm (196.89 ... 216.54 inch)²⁾

0 C
1 C
2 C
3 C
4 C
5 C

Rod, 24 mm (0.94 inch), PFA insulated with 48 mm (1.89 inch) stilling well in 316L stainless steel

Add Order code Y01 and Y02 and plain text:

"Insertion length ... mm and active shield length ... mm"

250 ... 1 000 mm (9.84 ... 39.37 inch)

1 001 ... 2 000 mm (39.41 ... 78.74 inch)²⁾³⁾

2 001 ... 3 000 mm (78.78 ... 118.11 inch)²⁾³⁾

3 001 ... 4 000 mm (118.15 ... 157.48 inch)²⁾³⁾

4 001 ... 5 000 mm (173.26 ... 196.88 inch)²⁾³⁾

5 001 ... 5 500 mm (196.89 ... 216.54 inch)²⁾³⁾

0 D
1 D
2 D
3 D
4 D
5 D

Process connection (316L stainless steel)

Single piece flange, raised face

1½", ASME, 150 lb

1½", ASME, 300 lb

1½", ASME, 600 lb

2", ASME, 150 lb

2", ASME, 300 lb

2", ASME, 600 lb

3", ASME, 150 lb²⁾

3", ASME, 300 lb²⁾

3", ASME, 600 lb²⁾

4", ASME, 150 lb²⁾

4", ASME, 300 lb²⁾

4", ASME, 600 lb²⁾

6", ASME, 150 lb²⁾

6", ASME, 300 lb²⁾

6", ASME, 600 lb²⁾

B 1
B 2
B 3

C 1
C 2
C 3

D 1
D 2
D 3

E 1
E 2
E 3

F 1
F 2
F 3

Selection and Ordering data

Article No.

SITRANS LC500, Single Piece Flanged with Rod Sensor

Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.

Single piece flange, Type B1 raised face

DN 40, PN 16

DN 40, PN 40

DN 50, PN 16

DN 50, PN 40

DN 80, PN 16

DN 80, PN 40²⁾

DN 100, PN 16²⁾

DN 100, PN 40²⁾

DN 125, PN 16²⁾

DN 125, PN 40²⁾

K 4
K 5
L 4
L 5
M 4
M 5
N 4
N 5
P 4
P 5

Single piece flange with PTFE flange facing

(applicable with versions 0A ... 3A and 0C ... 5C)⁴⁾

1½" ASME, 150 lb

1½", ASME, 300 lb

1½", ASME, 600 lb

2", ASME, 150 lb

2", ASME, 300 lb

2", ASME, 600 lb

3", ASME, 150 lb²⁾

3", ASME, 300 lb²⁾

3", ASME, 600 lb²⁾

4", ASME, 150 lb²⁾

4", ASME, 300 lb²⁾

4", ASME, 600 lb²⁾

6", ASME, 150 lb²⁾

6", ASME, 300 lb²⁾

6", ASME, 600 lb²⁾

B 4
B 5
B 6
C 4
C 5
C 6
D 4
D 5
D 6
E 4
E 5
E 6
F 4
F 5
F 6

Single piece flange with PTFE flange facing
(applicable with versions 0A ... 3A, 0C ... 5C)⁴⁾

DN 40, PN 16

DN 40, PN 40

DN 50, PN 16

DN 50, PN 40

DN 80, PN 16

DN 80, PN 40²⁾

DN 100, PN 16²⁾

DN 100, PN 40²⁾

DN 125, PN 16²⁾

DN 125, PN 40²⁾

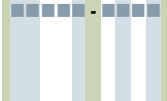
K 6
K 7
L 6
L 7
M 6
M 7
N 6
N 7
P 6
P 7

(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LC500, Single Piece Flanged with Rod Sensor Inverse frequency shift capacitance level and interface transmitter for extreme and critical process conditions, such as oil and liquid gas, toxic and aggressive chemicals and vapours.	7ML5517- 	Further designs Please add "-Z" to Article No. and specify Order code(s).	
Approvals General Purpose: CE, CSA, FM, RCM CSA / FM Class I, Div. 2, Groups A, B, C, D CSA / FM Class II, III, Div. 1, Groups E, F, G T4 ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C FM Class I, Div.1, Groups A, B, C, D, T4	1 2 4 6	Insertion length, specify in plain text: Y01: ... mm Active shield length, specify in plain text [min. length is 50 mm (2 inch)]: Y02: ... mm Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000 Inspection Certificate Type 3.1 per EN 10204 Manufacturing Test Report (Electrode Test)	Y01 Y02 Y15 C11 C12 C18
Enclosure/Cable inlet Aluminum epoxy coated 2 x ½" NPT, IP68 2 x M20 x1.5 (IP68, adapter)	1 2	Operating Instructions Accessories	See page 4/345 See page 4/345
Options None Slotted holes instead of standard vent holes in stilling well (Refer to manual for dimensions) ⁵⁾	A B		
Thermal isolator/remote version Without thermal isolator Isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F) Remote electronics with mounting bracket and cable ⁶⁾ <ul style="list-style-type: none"> Length: 2 m (79 inch) Length: 3 m (118 inch) Length: 4 m (158 inch) Length: 5 m (197 inch) 	A B C D E F		
Electronic output 2-wire loop current 4 ... 20 mA (transmitter MSP 2002-2 _3300 pF)	1		

1) A minimum span of 3 pF must be maintained

2) Custom shipping methods required. Contact factory for more details.

3) Available with process connection 2" or larger, and only available with process connection options C1 ... F3, L4 ... P5

4) Not available with versions 0E and 0F

5) Available with version 0B ... 3B, 0D ... 5D and 0F only

6) Available with approval option 1 only

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data

Article No.

SITRANS LC500, Extended Cable version with Rod Sensor, threaded connection or welded flange¹⁾

Inverse frequency shift capacitance level and interface transmitter for short range continuous measurement in large storage vessels.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Version²⁾

Rod, 16 mm (0.63 inch), PFA insulated and 316L stainless steel flexible extension tube

Total insertion length:

Add Order code Y01 and plain text: "Total insertion length ... mm and Y02 and plain text:

Active shield length ... mm³⁾⁴⁾

- 5 000 ... 10 000 mm (196.85 ... 393.70 inch)¹⁾
- 10 001 ... 15 000 mm (393.74 ... 590.55 inch)¹⁾
- 15 001 ... 20 000 mm (590.59 ... 787.40 inch)¹⁾
- 20 001 ... 25 000 mm (787.44 ... 984.25 inch)¹⁾
- 25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)¹⁾
- 30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)¹⁾

Rod, 24 mm (0.94 inch), PFA insulated and 316L stainless steel flexible extension tube

Total insertion length:

Add Order code Y01 and plain text: "Total insertion length ... mm and Y02 and plain text:

Active shield length ... mm³⁾⁴⁾

- 5 000 ... 10 000 mm (196.85 ... 393.70 inch)¹⁾
- 10 001 ... 15 000 mm (393.74 ... 590.55 inch)¹⁾
- 15 001 ... 20 000 mm (590.59 ... 787.40 inch)¹⁾
- 20 001 ... 25 000 mm (787.44 ... 984.25 inch)¹⁾
- 25 001 ... 30 000 mm (984.29 ... 1 181.10 inch)¹⁾
- 30 001 ... 35 000 mm (1 181.14 ... 1 377.95 inch)¹⁾

Process connection (316L stainless steel)

Threaded connection

2" NPT [(Taper), ANSI/ASME B1.20.1]

R 2" [(BSPT), EN 10226/PT (JIS-T), JIS B 0203]

G 2" [(BSPP), EN ISO 228-1/PF (JIS-P) JIS B 0202]

Welded flange, raised face

2", ASME, 150 lb

2", ASME, 300 lb

3", ASME, 150 lb¹⁾

3", ASME, 300 lb¹⁾

4", ASME, 150 lb¹⁾

4", ASME, 300 lb¹⁾

6", ASME, 150 lb¹⁾

6", ASME, 300 lb¹⁾

Welded flange, Type A flat faced

DN 50, PN 16

DN 50, PN 40

DN 80, PN 16

DN 80, PN 40¹⁾

DN 100, PN 16¹⁾

DN 100, PN 40¹⁾

DN 125, PN 16¹⁾

DN 125, PN 40¹⁾

(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1 standard.)

Approvals

General Purpose: CE, CSA, FM, RCM

CSA / FM Class I, Div. 2, Groups A, B, C, D

CSA / FM Class II, III, Div. 1, Groups E, F, G T4

ATEX II 3G 2D EEx nA [ib] IIC T6 ... T4 T 100 °C

ATEX II 1/2 GD EEx d [ia] IIC T6 ... T1 T 100 °C

FM Class I, Div. 1, Groups A, B, C, D T4

Article No.

Selection and Ordering data

Article No.

SITRANS LC500, Extended Cable version with Rod Sensor, threaded connection or welded flange¹⁾

Inverse frequency shift capacitance level and interface transmitter for short range continuous measurement in large storage vessels.

Enclosure/Cable inlet

Aluminum epoxy coated

2 x 1/2" NPT, IP68

2 x M20x1.5 (IP68, adapter)

Options

No additional options

With mounting eye

Thermal isolator

Without thermal isolator

Isolator, only for use when temperature range is outside of -40 ... +85 °C (-40 ... +185 °F), explosion proof approval -40 ... +70 °C (-40 ... +158 °F)

Electronic output

2-wire loop current 4 ... 20 mA

(transmitter MSP 2002-2 _3300 pF)

¹⁾ Custom shipping methods required. Contact factory for more details.

²⁾ A minimum span of 3 pF must be maintained.

³⁾ See dimension drawings on page 4/354 for further explanation of Y01.

⁴⁾ Inactive length is equal to the flexible extension plus transition. See dimension drawings on page 4/354 for further explanation of Y02.

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Accessories	
Please add "-Z" to Article No. and specify Order code(s).		General Purpose	
Insertion length, specify in plain text: Y01: to mm (Includes measuring range plus cable extension) - see dimensional information on page 4/354	Y01	1/2" NPT General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 6 ... 12 mm (0.236 ... 0.472 inch)	7ML1830-1JA
Active shield/cable extension length, specify in plain text [min. length is 50 mm (2 inch)]: Y02: to mm (see dimensional information on page 4/354)	Y02	M20x1.5 General Purpose Cable Entry IP68/IP69K NEMA6, -40 ... -100 °C (-40 ... -212 °F), cable size 7 ... 12 mm (0.275 ... 0.472 inch)	7ML1830-1JC
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15	Hazardous Locations	
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	C11	1/2" NPT EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22, and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JB
Inspection Certificate Type 3.1 per EN 10204	C12	M20 EMC rated Cable Gland: Dust Ignition Proof, Flameproof Exd, and Increased Safety ATEX II 2 GD ExtD A21 (Zone 1, Zone 2, Zone 21, Zone 22 and in Gas Groups IIA, IIB and IIC) -60 ... +80 °C IP66, IP67, IP68, NEMA4X, cable sizes 5.5 ... 12 mm (0.216 ... 0.472 inch)	7ML1830-1JD
Operating Instructions	Article No.	Transmitter, MSP 2002-1, 330 PF ¹⁾	7ML1830-1JP
English	7ML1998-5GE04	Transmitter, MSP 2002-2, 3 300 PF ¹⁾	7ML1830-1JQ
French	7ML1998-5GE12	Transmitter, MSP 2002-3, 6 600 PF (used with conductive fluids and probe lengths >10 000 mm) ¹⁾	7ML1830-1JR
Spanish	7ML1998-5GE21	SITRANS RD100, loop powered display - see Chapter 7	7ML5741-...
German	7ML1998-5GE33	SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	7ML5740-...
Note: The Operating Instructions should be ordered as a separate line item on the order.		SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	7ML5744-...
This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.		SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	7ML5750-...
		For applicable back up point level switch - see point level measurement section	
		¹⁾ Transmitters not suitable for Intrinsically Safe application (ATEX II 1G EEx ia IIC T4 or CSA/FM Class 1 Div. 1 Groups A, B, C and D)	
		Please contact ceg.smpi@siemens.com for special requests.	

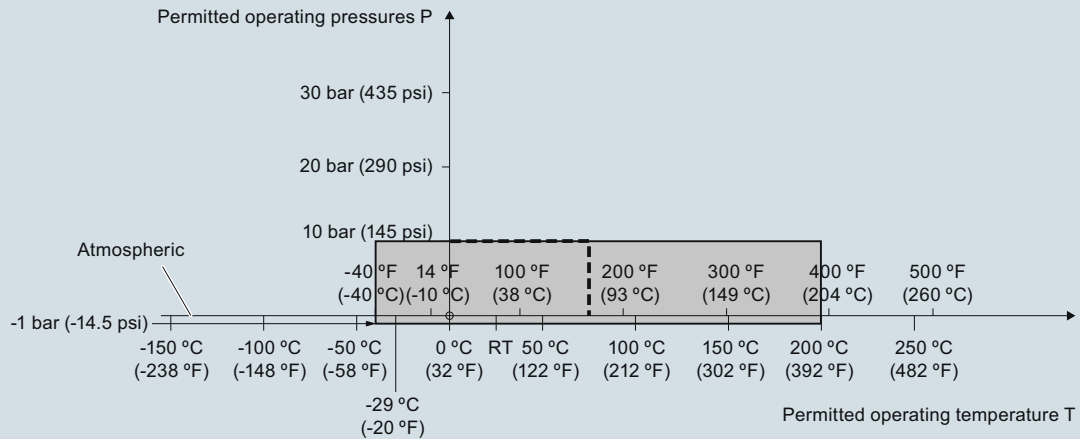
Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Characteristic curves

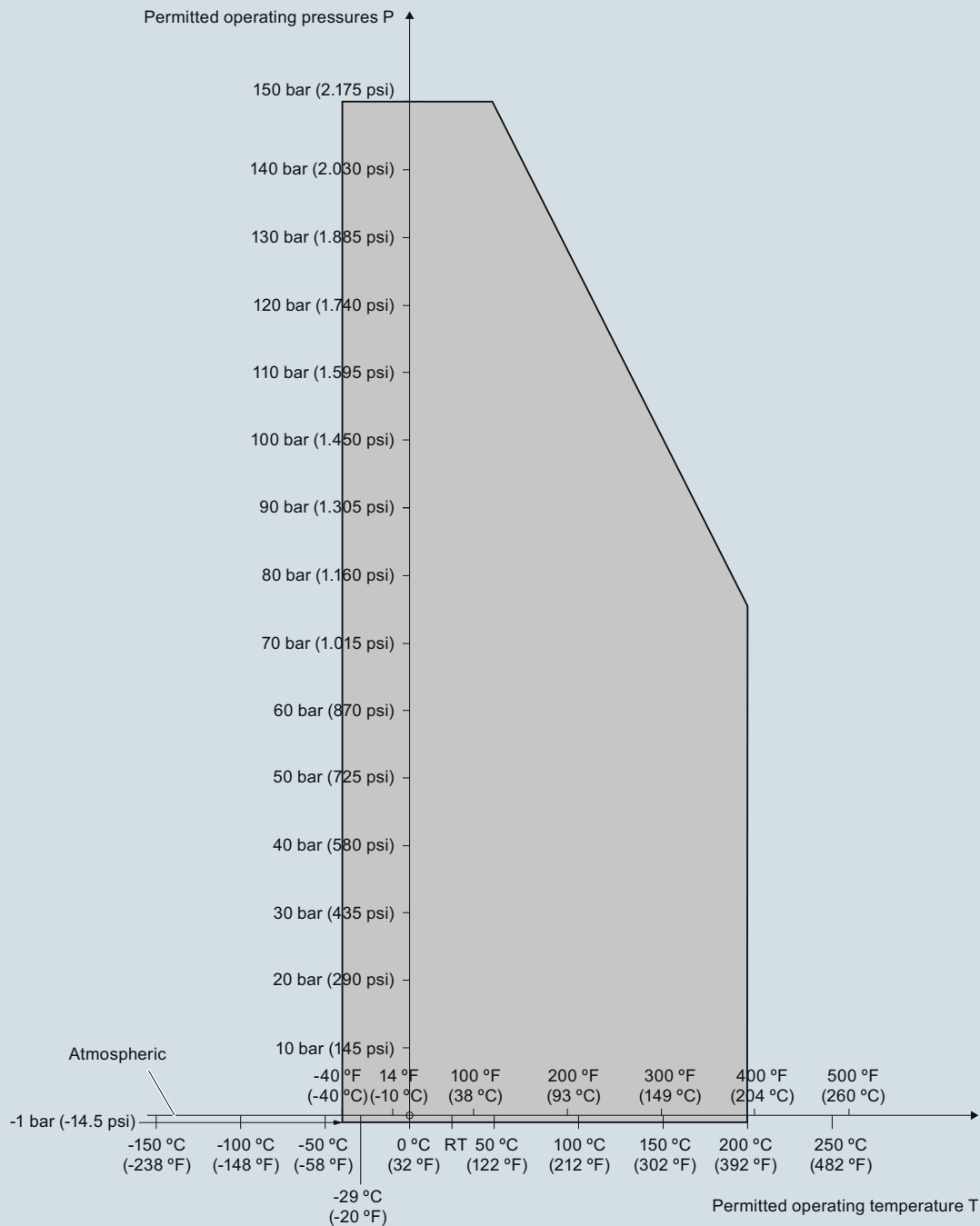
Pressure/temperature curve
LC500 cable probes
threaded process connections
(7ML5513)



----- Example:
permitted operating pressure = 10 bar (145 psi) at 75 °C

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5513)

Pressure/temperature curve
LC500 PFA rod probes
Threaded process connections
(7ML5515)



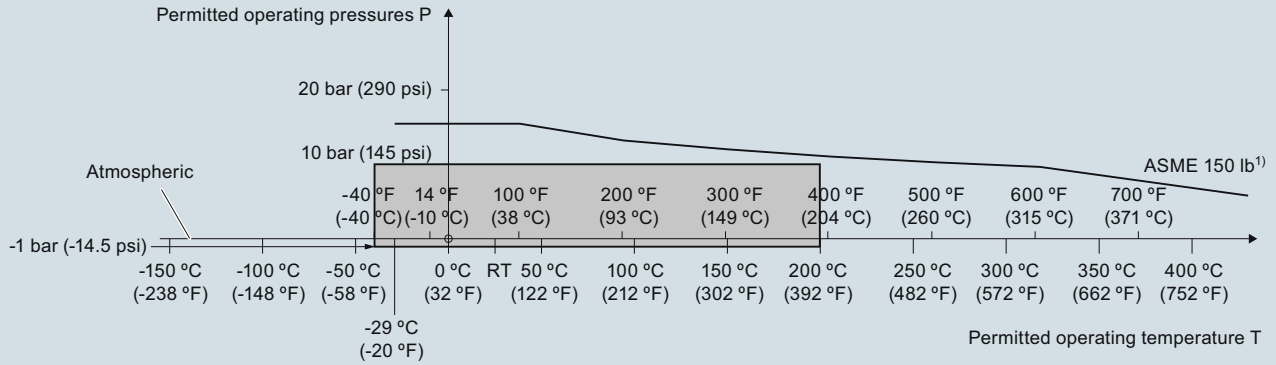
SITRANS LC500 Process Pressure/Temperature derating curves (7ML5515)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

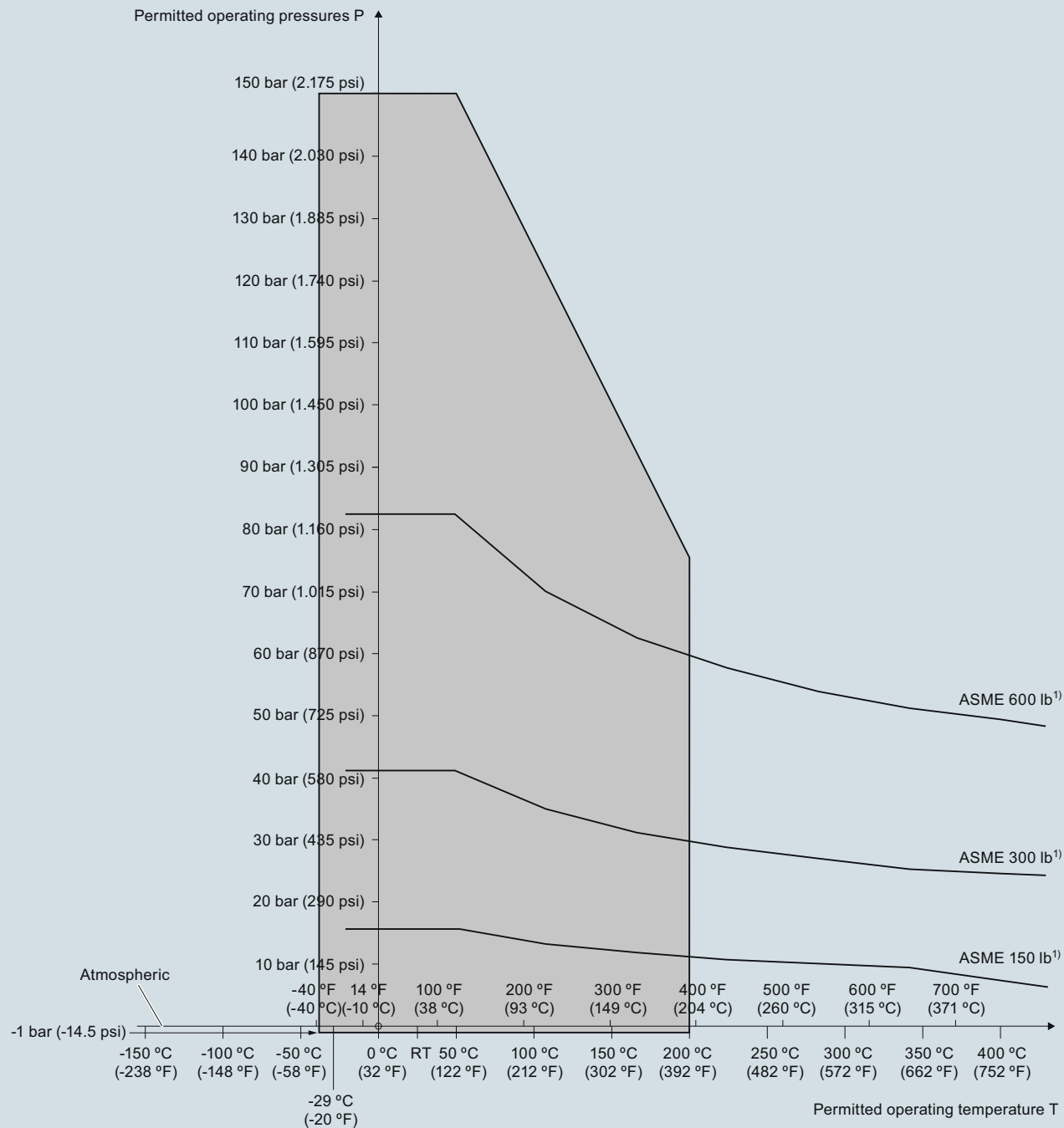
Pressure/temperature curve
LC500 cable probes
ASME flanged process connections
(7ML5513)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5513)

Pressure/temperature curve
 LC500 PFA rod probes
 ASME flanged process connections
 (7ML5515 and 7ML5517)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

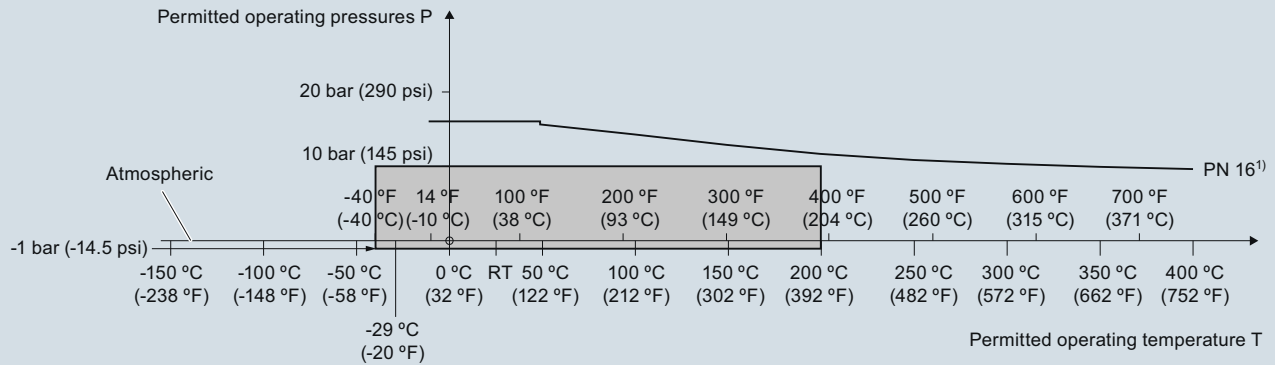
SITRANS LC500 Process Pressure/Temperature derating curves (7ML5515 and 7ML5517)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

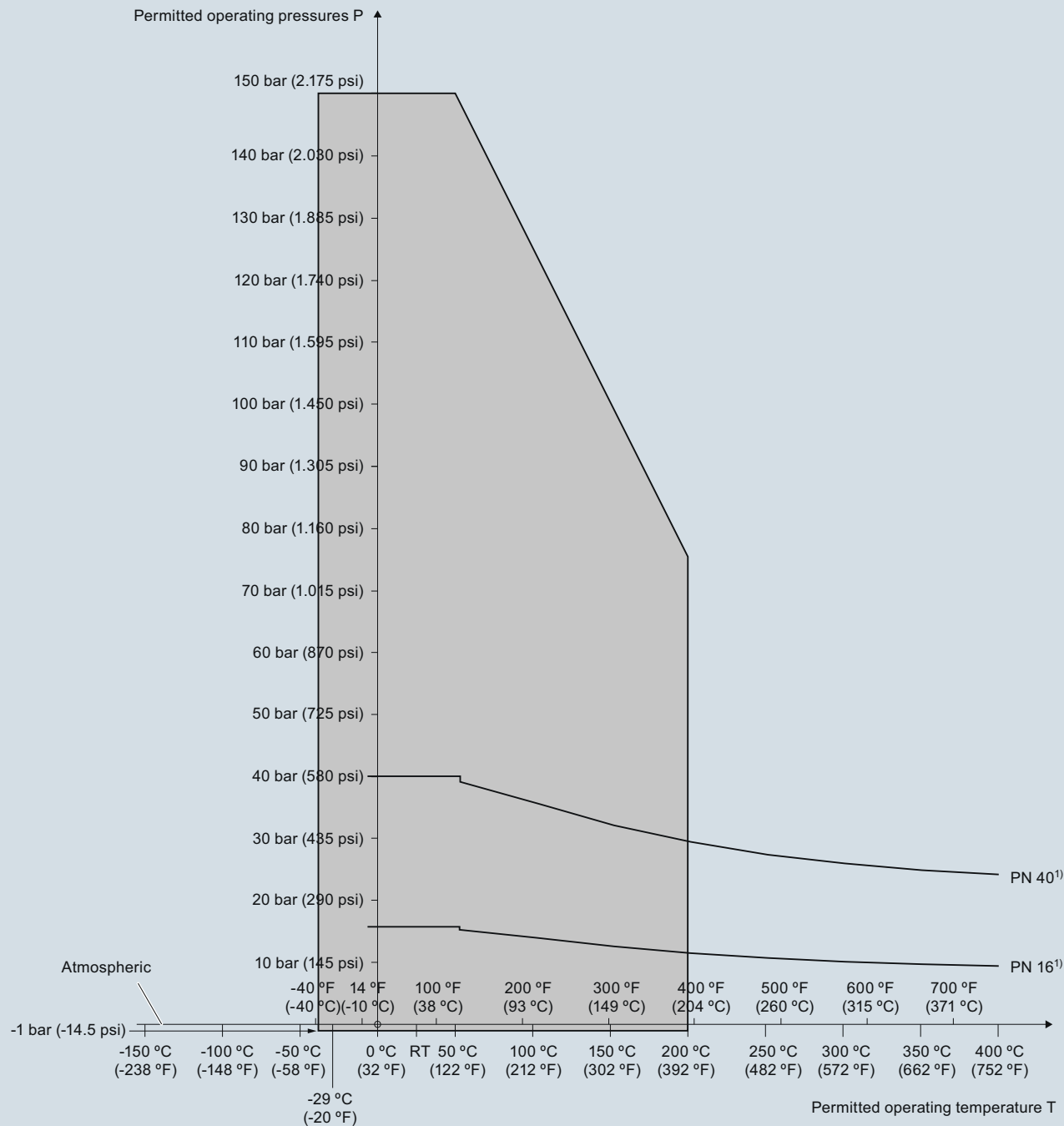
Pressure/temperature curve
LC500 cable probes
EN flanged process connections
(7ML5513)



1) The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5513)

Pressure/temperature curve
LC500 PFA rod probes
EN flanged process connections
(7ML5515 and 7ML5517)



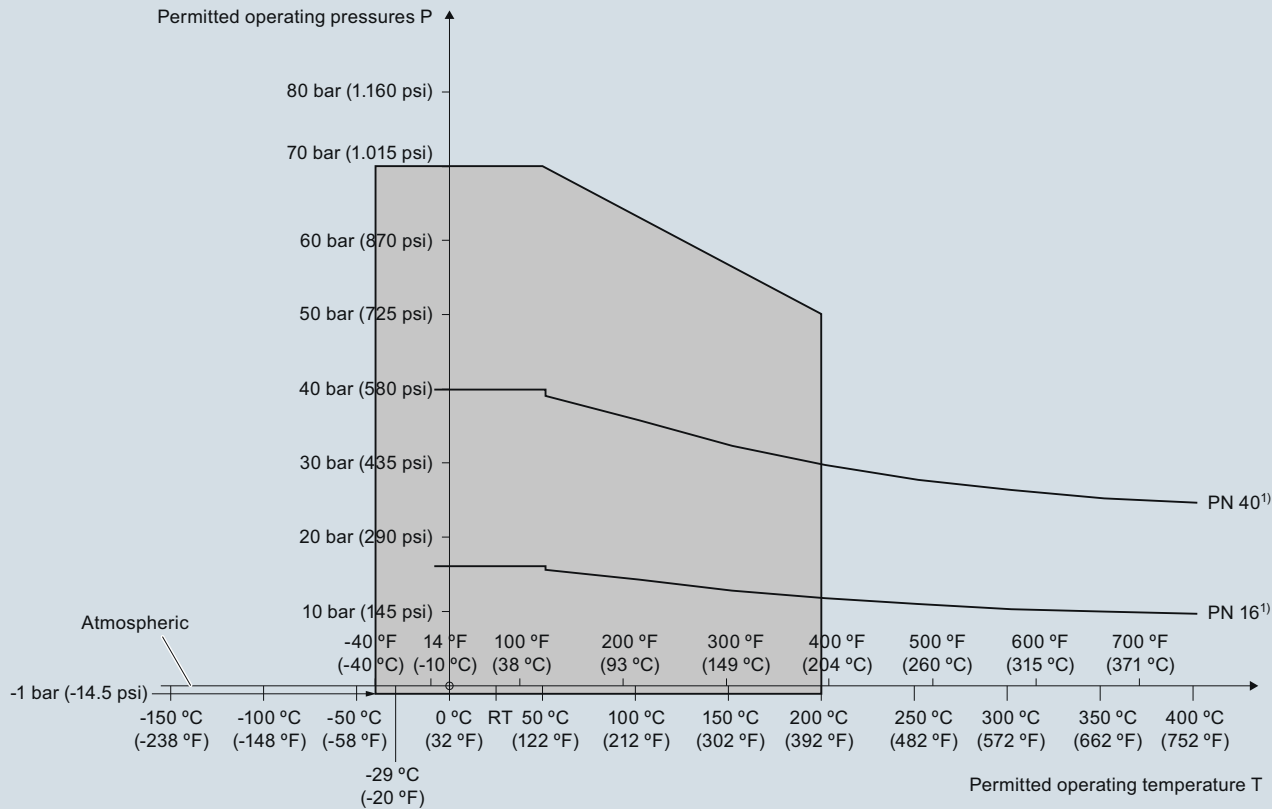
SITRANS LC500 Process Pressure/Temperature derating curves (7ML5515 and 7ML5517)

Level Measurement

Continuous level measurement – Capacitance transmitters

SITRANS LC500

Pressure/temperature curve
LC500 single piece flanged rod probes with PTFE facing
EN flanged process connections
(7ML5517)

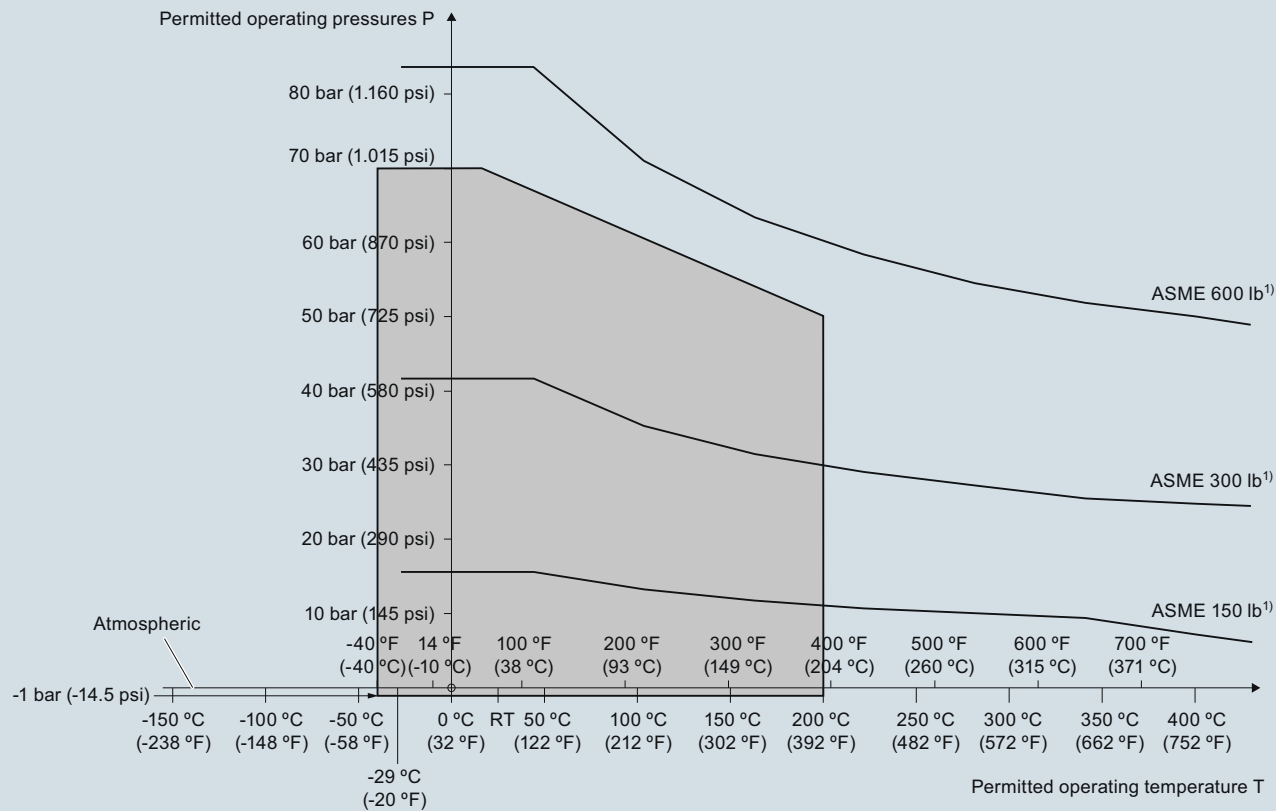


1) The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5517)

4

Pressure/temperature curve
LC500 single piece flanged rod probes with PTFE facing
ASME flanged process connections
(7ML5517)



¹⁾ The curve denotes the minimum allowable flange class for the shaded area below.

SITRANS LC500 Process Pressure/Temperature derating curves (7ML5517)

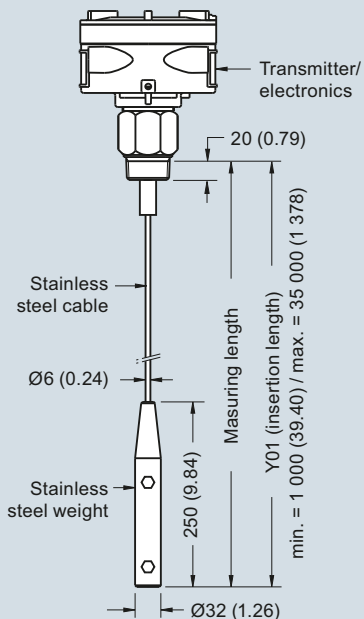
Level Measurement

Continuous level measurement – Capacitance transmitters

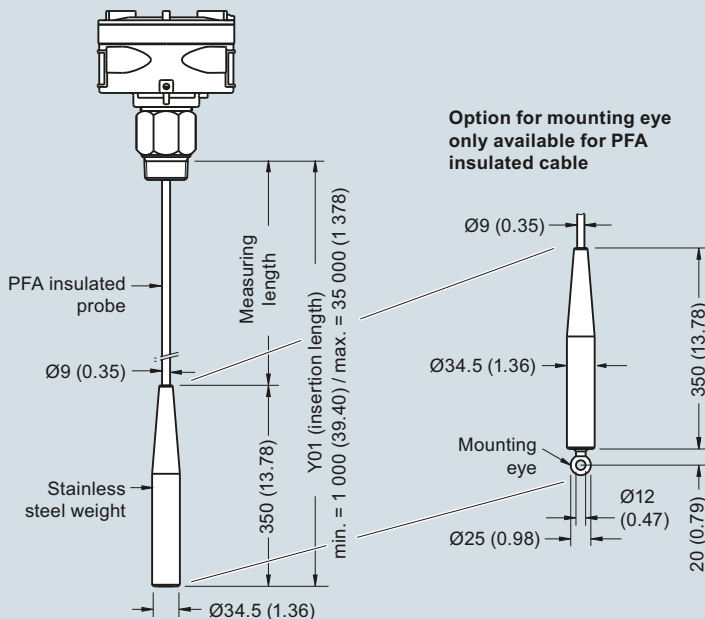
SITRANS LC500

Dimensional drawings

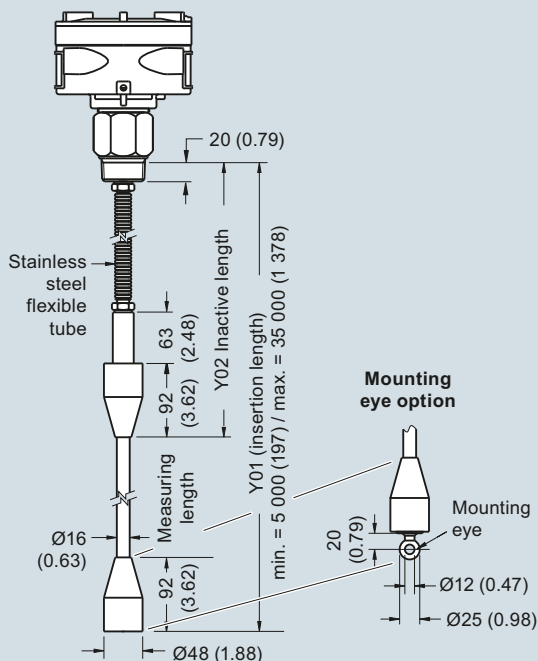
Cable version, non-insulated
welded flange (7ML5513)



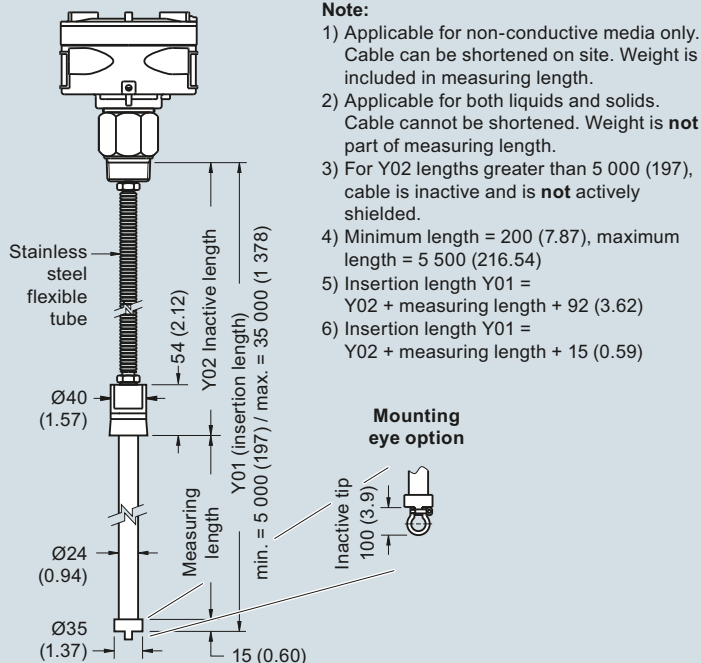
Cable version, insulated
welded flange (7ML5513)



Extended cable version with rod sensor
welded flange (7ML5523)



Extended cable version with rod sensor
welded flange (7ML5523)

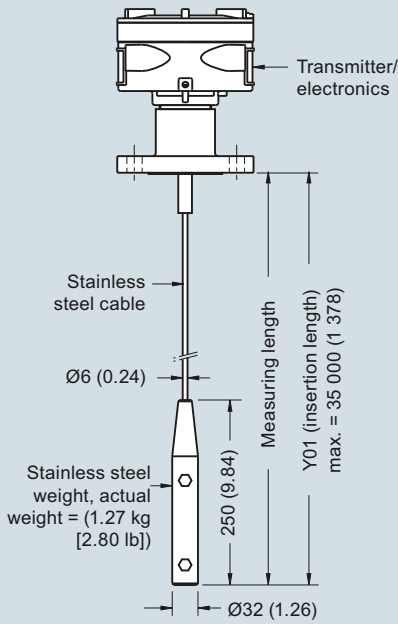


Note:

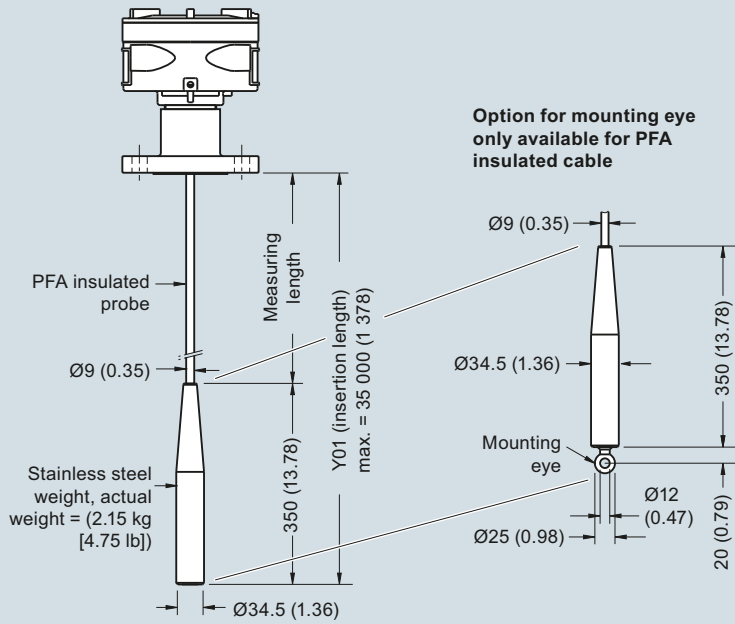
- 1) Applicable for non-conductive media only. Cable can be shortened on site. Weight is included in measuring length.
- 2) Applicable for both liquids and solids. Cable cannot be shortened. Weight is **not** part of measuring length.
- 3) For Y02 lengths greater than 5 000 (197), cable is inactive and is **not** actively shielded.
- 4) Minimum length = 200 (7.87), maximum length = 5 500 (216.54)
- 5) Insertion length Y01 = Y02 + measuring length + 92 (3.62)
- 6) Insertion length Y01 = Y02 + measuring length + 15 (0.59)

SITRANS LC500 - Cable Versions, dimensions in mm (inch)

Cable version, non-insulated¹⁾
Welded flange (7ML5513)

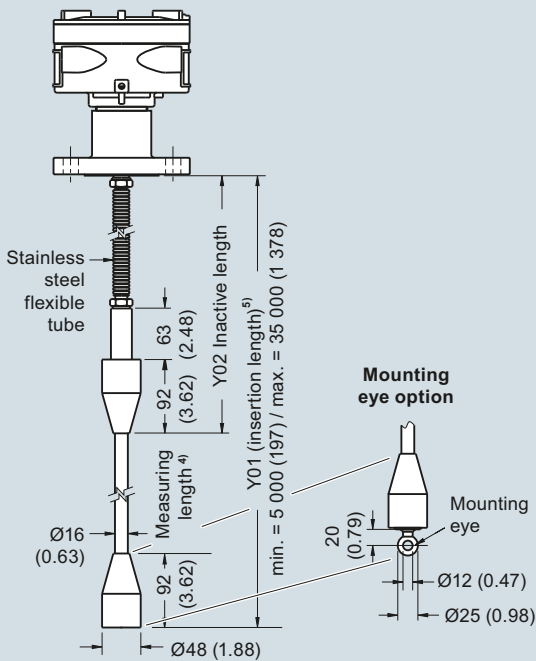


Cable version, insulated²⁾
Welded flange (7ML5513)

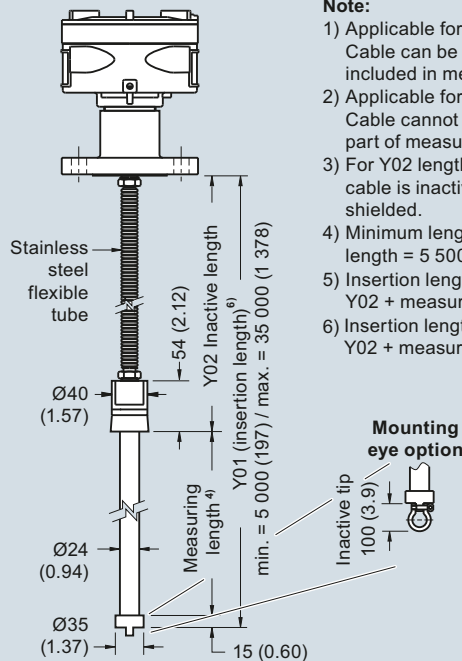


Option for mounting eye only available for PFA insulated cable

Extended cable version with rod sensor³⁾
Welded flange (7ML5523)



Extended cable version with rod sensor³⁾
Welded flange (7ML5523)



Note:

- 1) Applicable for non-conductive media only. Cable can be shortened on site. Weight is included in measuring length.
- 2) Applicable for both liquids and solids. Cable cannot be shortened. Weight is **not** part of measuring length.
- 3) For Y02 lengths greater than 5 000 (197), cable is inactive and is **not** actively shielded.
- 4) Minimum length = 200 (7.87), maximum length = 5 500 (216.54)
- 5) Insertion length Y01 = Y02 + measuring length + 92 (3.62)
- 6) Insertion length Y01 = Y02 + measuring length + 15 (0.59)

SITRANS LC500 - Cable Versions, dimensions in mm (inch)

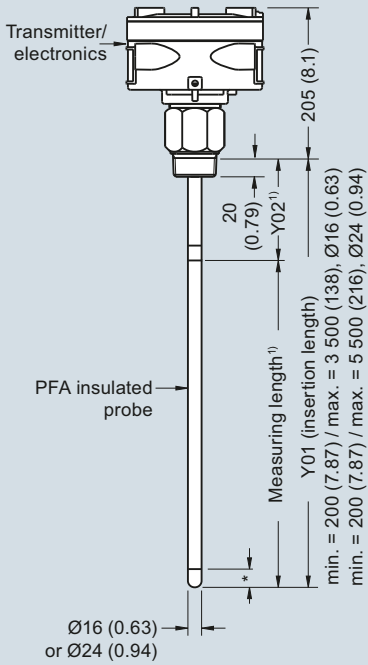
Level Measurement

Continuous level measurement – Capacitance transmitters

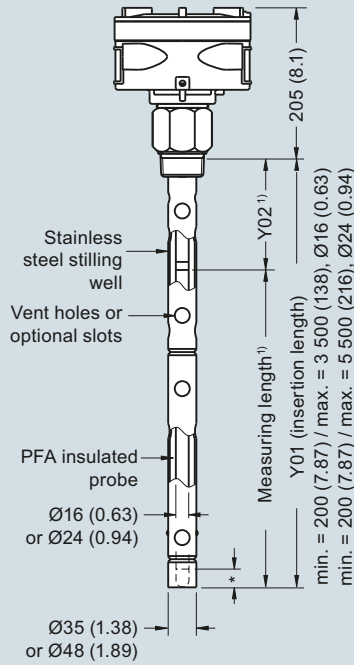
SITRANS LC500

4

Rod version threaded (7ML5515)



Rod version with stilling well threaded (7ML5515)

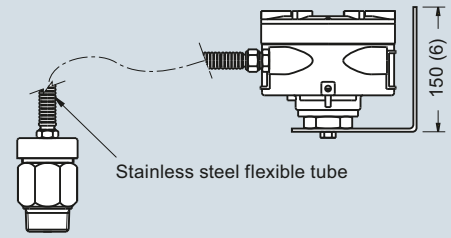


* = 30 (1.18) inactive tip

Note:

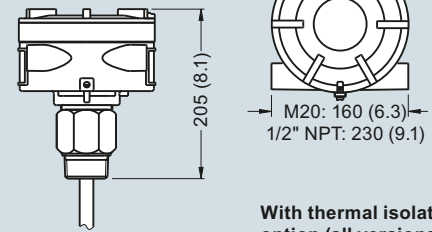
- 1) Minimum Y02 (active shield length) = 50 (1.96), minimum measuring length = 200 (7.87)

Remote electronics with mounting bracket option threaded (7ML5515)



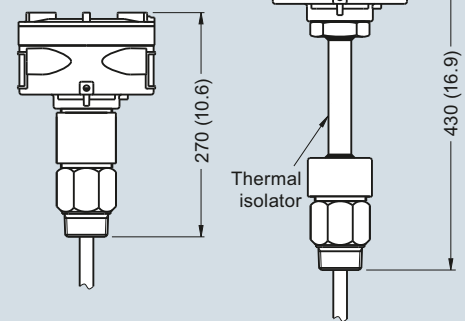
General purpose approval only.

Standard configuration (all versions)



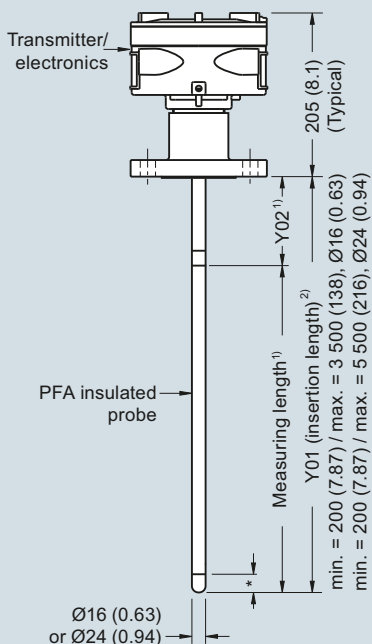
With thermal isolator option (all versions)

With explosion-proof seal option (all versions)

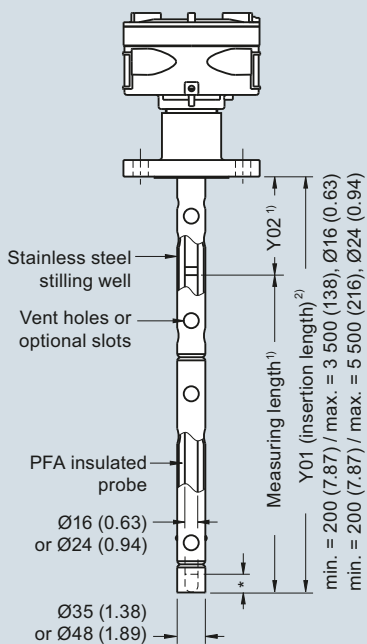


SITRANS LC500 - Rod Versions, dimensions in mm (inch)

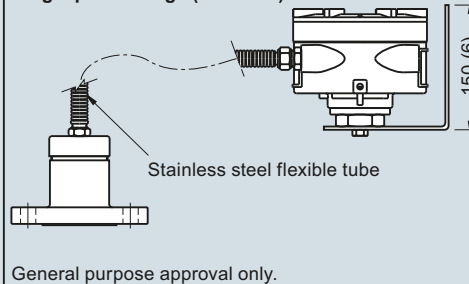
Rod version
Welded flange (7ML5515)
Single piece flange (7ML5517)



Rod version with stilling well
Welded flange (7ML5515)
Single piece flange (7ML5517)

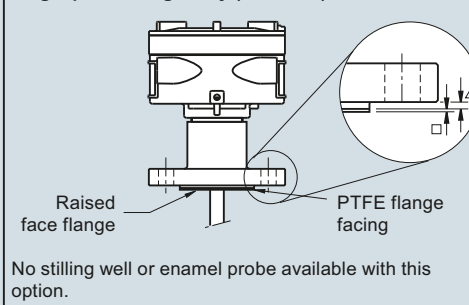


Remote electronics with mounting bracket option
Welded flange (7ML5515)
Single piece flange (7ML5517)

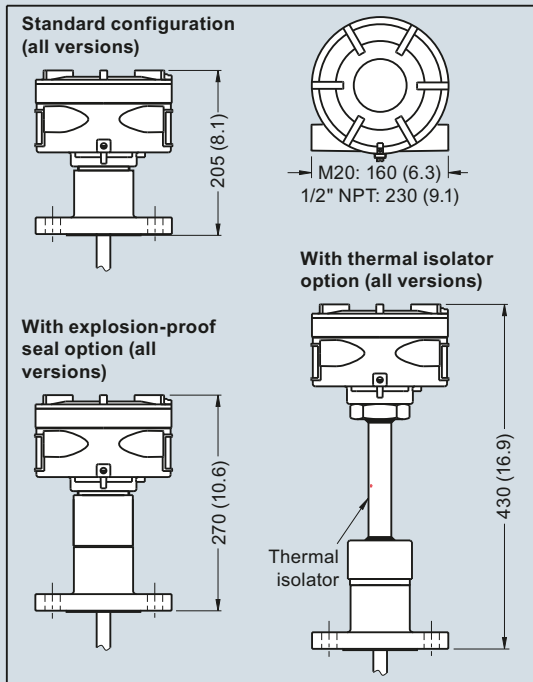


General purpose approval only.

PTFE flange facing option
single piece flange only (7ML5517)



* = 30 (1.18) inactive tip



Flange facing (raised face)	
Flange class	Facing thickness
△ ASME 150/300	2 (0.08)
△ ASME 600/900	7 (0.28)
△ PN16/25/40/64	2 (0.08)
□ PTFE facing (additional)	2 (0.08)

Notes:

- 1) Minimum Y02 (active shield length) = 50 (1.96), minimum measuring length = 200 (7.87)
- 2) Insertion length does not include any raised face/gasket face dimension (see Flange Facing table above).

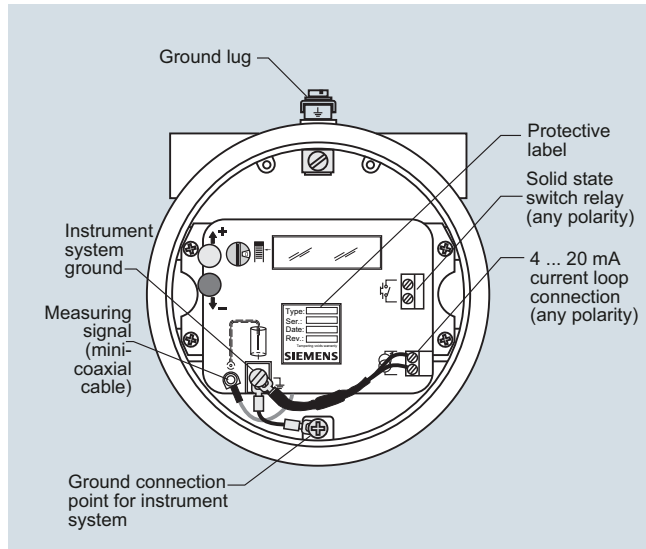
SITRANS LC500 - Rod Versions, dimensions in mm (inch)

Level Measurement

Continuous level measurement – Capacitance transmitters



SITRANS LC500

Schematics


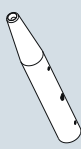
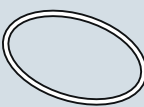
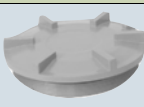





SITRANS LC500 connections

Selection and ordering data**LC300 and LC500 Specials¹⁾**

	Article No.
LC300 Cable Extensions, 316L stainless steel	
Kit, stainless steel cable extension, 1 m, adjustable by customer	A5E01163688
Kit, stainless steel cable extension, 3 m, adjustable by customer	A5E01163689
Kit, stainless steel cable extension, 5 m, adjustable by customer	A5E01163690
Kit, stainless steel cable extension, 10 m, adjustable by customer	A5E01163691
Kit, stainless steel cable extension, 15 m, adjustable by customer	A5E01163693
Kit, stainless steel cable extension, 20 m, adjustable by customer	A5E01163695
LC300 Cable Extensions, 316 stainless steel with PFA coating	
Kit, PFA cable extension, 1 m	A5E01163709
Kit, PFA cable extension, 3 m	A5E01163710
Kit, PFA cable extension, 5 m	A5E01163711
Kit, PFA cable extension, 10 m	A5E01163712
Kit, PFA cable extension, 15 m	A5E01163713
Kit, PFA cable extension, 20 m	A5E01163714

LC300 and LC500 Specials¹⁾

	Article No.
LC300 Mounting Eye	
Spare mounting eye (LC300 PFA versions only)	A5E01163717
LC300 Weight Kit, 316L stainless steel	
Kit, Spare stainless steel weight. To be used in any cable version of CLS300, or stainless steel cable version of LC300	A5E01163727
LC500 Gasket (IP65), Silicone	
Spare gasket, LC500 enclosure version, IP65	A5E01163728
LC500 Blind Lid	
Spare LC500 aluminum blind lid	A5E01163729
LC500 Mounting Eye	
Spare mounting eye (PFA cable version only)	A5E01163717
LC500 Mounting Bracket	
Spare mounting bracket	A5E01163730
LC500 Sanitary Versions²⁾	

¹⁾ Special flange sizes and facings are available. Please contact ceg.smpi@siemens.com for part number and pricing. Submit Application Questionnaire found on page 4/11.

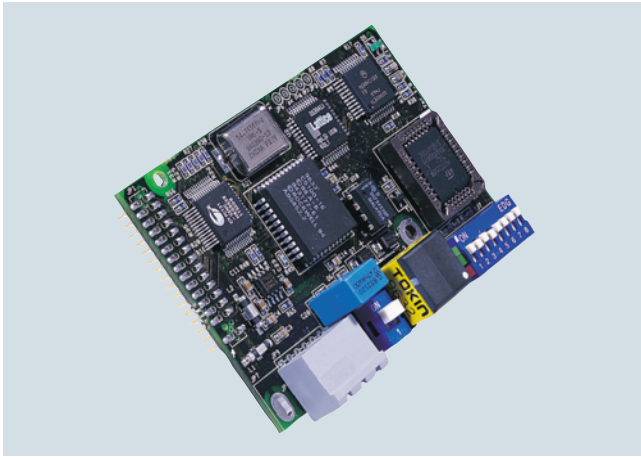
²⁾ Please contact ceg.smpi@siemens.com for part number and pricing. Submit Application Questionnaire found on page 4/11.

Please contact ceg.smpi@siemens.com for special requests.

Level Measurement Communication

SmartLinx module

Overview



SmartLinx modules provide direct digital connection to popular industrial communications buses with true plug-and-play compatibility with products manufactured by Siemens.

Benefits

- Fast, easy installation
- Direct connection: no additional installation required
- Scalable application layer allows for optimized network bandwidth and memory requirements
- Modules available for PROFIBUS DP and DeviceNet

Application

Many Siemens products include HART, PROFIBUS PA and Modbus communications. For additional communication modules, SmartLinx cards are the answer.

They're fast and easy to install, and can be added at any time. The module simply plugs into the socket on any SmartLinx-enabled product. They require no secondary private buses or gateways and no separate wiring. There are no extra boxes to connect to your network so there's a minimum load on engineering and maintenance staff.

SmartLinx provides all data from the instrument, including measurement and status, and allows changes to operation parameters to be done over the bus or telemetry link. The user can select which data in the application layer to transfer over the bus. This selection saves bandwidth and memory and optimizes data throughput and speeds up the network, enabling you to connect more instruments to your network.

Technical specifications

Module type	PROFIBUS DP
• Interface	RS 485 (PROFIBUS standard)
• Transmission rate	All valid PROFIBUS DP rates from 9 600 Kbps to 12 Mbps
• Rack address	0 ... 99
• Connection	Slave
• SmartLinx module compatibility	<ul style="list-style-type: none"> • MultiRanger 100/200 • HydroRanger 200

Module type	DeviceNet
• Interface	DeviceNet physical layer
• Transmission rate in kbps	125, 250, 500
• Rack address	0 ... 63
• Connection	Slave (group 2)
• SmartLinx module compatibility	<ul style="list-style-type: none"> • MultiRanger 100/200 • HydroRanger 200

Selection and Ordering data

Article No.

SmartLinx module for MultiRanger 100/200 and HydroRanger 200	Article No.
PROFIBUS DP module	7ML1830-1HR
DeviceNet module	7ML1830-1HT
Operating Instructions	
PROFIBUS communications module	
• English	7ML1998-1AQ03
• French	7ML1998-1AQ13
• German	7ML1998-1AQ33
DeviceNet	7ML1998-1BH02
This device is shipped with the Siemens Milltronics manual DVD containing Quick Starts and Operating Instructions.	
• English	7ML1998-1BH02
• French	7ML1998-1BH12
Spare SmartLinx software	
PROFIBUS DP data diskette	7ML1830-1CL
DeviceNet data diskette	7ML1830-1CM

Overview

Dolphin Plus is instrument configuration software that allows you to quickly and easily configure, monitor, tune and diagnose several Siemens level devices remotely (see list below). Remote access is available using your desktop PC or connected directly in the field using a laptop.

Benefits

- Real-time monitoring and adjustment of parameters
- On-screen visualization of process values
- Saving and visualization of echo profiles for a wide range of Siemens level meters
- Copying of data for programming several devices
- Quick setup and commissioning of device
- Generation of configuration reports within seconds

Note:

The Dolphin Plus software is only available in English.

Application

Dolphin Plus is easy to install and use. Just load the software from the DVD. In minutes, you're ready to set up or modify complete parameter configurations for one or more devices.

Following configuration, you can alter parameters, upload and download parameter sets to and from disk, and use parameter sets saved from other instruments. Reading of echo profiles permits fine tuning without the need for special instruments. Built-in quick start wizards and help functions guide you through the entire process.

Compatibility

Dolphin Plus is compatible with Microsoft Windows 95/98/NT4/Me/2000/XP and works with a wide range of Siemens products, including:

- SITRANS LU10
- SITRANS LU02
- SITRANS LU01

Connection to a Siemens instrument may be a direct RS 232 serial connection or via an RS 485 converter or Siemens infrared ComVerter, depending on the instrument being configured.

Meets VDE 2187 user interface requirements.

(Most other Siemens level devices use Simatic PDM configuration software.)

Selection and Ordering data

Article No.

Dolphin Plus**7ML1841-**

Instrument configuration software that quickly and easily configure, monitor, tune and diagnose most Siemens devices remotely, from your desktop PC or connected directly in the field using a laptop.

Dolphin Plus Software includes a software DVD, and a nine pin adapter with a 2.1 m (82.7 inch) cable for connection to a PC serial port.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

AA0

RS 485 to RS 232 converter

No

Yes

0

1

ComVerter

No

Yes

0

1

Selection and Ordering data

Article No.

Operating Instructions

Connection manual, English:
Included on Dolphin Plus DVD and available at
www.siemens.com/processautomation

Spare parts

Converter, RS 485 to RS 232 (D-Sub)

7ML1830-1HA

Kit containing one 9-pin D-Sub to RJ11 Adapter and one 2.1 meter telephone cable with two male jacks

7ML1830-1MC

ComVerter, Infrared link

7ML1830-1MM

Level Measurement

Notes

4

Positioners



5/2

Product Overview**SIPART PS2**

- 5/3 Technical description
- Technical specifications
- 5/8 - all versions
- 5/10 - SIPART PS2 with and without HART
- 5/11 - SIPART PS2 with PROFIBUS PA/
with FOUNDATION Fieldbus
- 5/13 - Option modules
- Selection and Ordering data
- 5/17 - SIPART PS2
- 5/20 - Accessories/Spare parts
- 5/22 Dimensional drawings
- 5/25 Schematics
- 5/26 Mounting kit

Software



- Sec. 8 SIMATIC PDM, for parametrize
HART and PROFIBUS PA devices

You can download all instructions, catalogs and certificates for positioners free of charge at the following Internet address:
www.siemens.com/positioners

Positioners

Product Overview

Overview

	Application	Description	Catalog page	Software for parameterization
Positioners				
	Position control of pneumatic linear or part-turn actuators, also for intrinsically safe operation	SIART PS2 Universal device for positioning pneumatic actuators <ul style="list-style-type: none"> • Connection: 4 to 20 mA • HART; PROFIBUS PA or FOUNDATION Fieldbus • Local manual operation • Binary inputs and outputs • Diagnostic function • Blocking function • Automatic startup 	5/3	SIMATIC PDM
	As above, but in flameproof enclosure for explosion-proof application	SIART PS2 As above, but in flameproof aluminum enclosure	5/3	SIMATIC PDM

Overview



Electropneumatic positioner SIPART PS2 in the Makrolon enclosure



SIPART PS2 electropneumatic positioner in flameproof aluminum enclosure



SIPART PS2 in stainless steel enclosure

The SIPART PS2 electropneumatic positioner is used to control the final control element of pneumatic linear or part-turn actuators. The electropneumatic positioner moves the actuator to a valve position corresponding to the setpoint. Additional function inputs can be used to block the valve or to set a safety position. A binary input is present as standard in the basic device for this purpose.

Benefits

SIPART PS2 positioners offer decisive advantages:

- Simple installation and automatic commissioning (self-adjustment of zero and span)
- Simple operation with
 - Local operation (manual operation) and configuration of the device using three buttons and a user-friendly two-line display
 - Parameterization via SIMATIC PDM
- Very high-quality control thanks to an online adaptation procedure
- Negligible air consumption in stationary operation
- "Tight closing" function (ensures maximum positioning pressure on the valve seat)
- "Fail in place" function: Current position is retained on electrical power failure (does not apply in conjunction with SIL)
- Numerous functions can be activated by simple configuring (e. g. characteristic curves and limits)
- Extensive diagnostic functions for valve and actuator
- Only one device version for linear and part-turn actuators
- Few moving parts, hence insensitive to vibrations
- External non contacting sensor as option for extreme ambient conditions
- "Intelligent solenoid valve": Partial Stroke Test and solenoid valve function in one device
- Partial Stroke Test e. g. for safety valves
- Full Stroke Test, Multi Step Response Test, Valve Performance Test for performance and maintenance evaluation of the valve
- Can also be operated with purified natural gas, carbon dioxide, nitrogen or noble gases
- SIL (Safety Integrity Level) 2

Application

The SIPART PS2 positioner is used, for example, in the following industries:

- Chemical/petrochemical
- Power stations
- Paper and glass
- Water, waste water
- Food and pharmaceuticals
- Offshore plants

The SIPART PS2 positioner is available:

- For single-acting actuators: In Makrolon, stainless steel or aluminum enclosure, as well as flameproof aluminum enclosure
- For double-acting actuators: In Makrolon enclosure, stainless steel enclosure and flameproof aluminum enclosure
- For non-hazardous applications
- For hazardous applications in the versions
 - Intrinsic safety type of protection
 - Flameproof enclosure type of protection
 - Non-sparking type of protection
 - Dust protection by enclosure type of protection

and in the versions:

- With 0/4 ... 20 mA control with/without communication through HART signal
- With PROFIBUS PA communication interface
- With FOUNDATION Fieldbus (FF) communications interface

Positioners

SIPART PS2

Technical description

Explosion-proof versions

- Device with protection type "intrinsic safety" for use in Zone 1, 2, 21, 22 or Class I, II, III/Division 1/Groups A-G
- Device with protection type "dust protection with enclosure" for use in Zone 21, 22 or Class II, III/Division 1/Groups E-G
- Device with protection type "non-sparking" for use in Zone 2 or Class I, Division 2, Groups A-D
- Device with protection type "flameproof enclosure" for use in Zone 1 or Class I, Division 1, Groups A-D

Stainless steel enclosure for extreme ambient conditions

The SIPART PS2 is available in a stainless steel enclosure (with no window in the cover) for use in particularly aggressive environments (e.g. offshore operation, chlorine plants etc.). The device functions are the same as for the basic version.

Design

The SIPART PS2 positioner is a digital field device with a highly-integrated microcontroller.

The positioner consists of the following components:

- Enclosure and cover
- PCB with corresponding electronics with or without communication through HART 7 or with electronics for communication in accordance with - PROFIBUS PA specification, IEC 61158-2; bus-supplied device, or - FOUNDATION Fieldbus (FF) specification, IEC 61158-2, bus-supplied device
- Position detection system
- Terminal housing with screw terminals
- Pneumatic valve manifold with piezoelectric valve precontrol.

The valve manifold is located in the housing, the pneumatic connections for the inlet air and the positioning pressure on the right-hand side. A pressure gauge block and/or a safety solenoid valve can be connected there as options. The SIPART PS2 positioner is fitted to the linear or part-turn actuator using an appropriate mounting kit. The circuit board container in the casing provides slots for separately ordered boards with the following functions:

Position feedback module

- Position feedback as a two-wire signal 4 to 20 mA

Alarm module (3 outputs, 1 input)

- Signaling of two limits of the travel or angle by binary signals. The two limits can be set independently as maximum or minimum values.
- Output of an alarm if the setpoint position of the final control element is not reached in automatic mode or if a device fault occurs.
- Second binary input for alarm signals of for triggering safety reactions, e. g. blocking function or safety position.

Limit signaling through slot-type initiators (SIA module)

Two limits can be signaled redundantly as NAMUR signals (EN 60947-5-6) by slot-type initiators. An alarm output is also integrated in the module (see "Alarm Module").

Limit value signal via mechanical contacts (mechanical limit switch module)

Two limits can be signaled redundantly by switching contacts. An alarm output is also integrated in the module (see "Alarm Module").

Valid for all modules described above:

All signals are electrically isolated from one another and from the basic unit. The outputs indicate self-signaling faults. The modules are easy to retrofit.

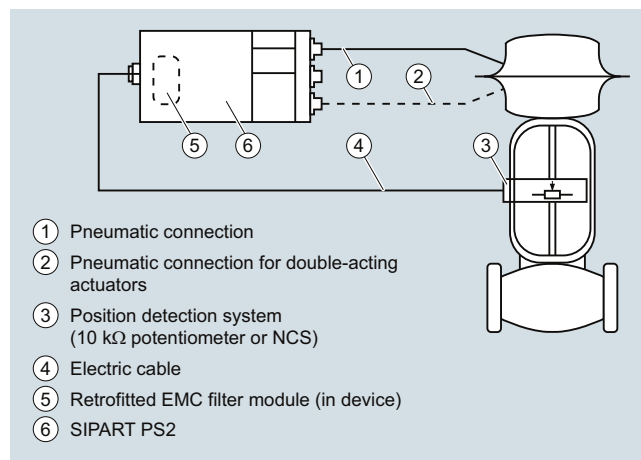
Separate mounting of position detection system and controller unit

The position detection system and controller unit can be connected separately for all casing versions of the SIPART PS2 (except flameproof design). Measurement of the travel or angle is carried out directly on the actuator. The controller unit can then be fitted a certain distance away, e. g. on a mounting pipe or similar, and is connected to the position detection system by an electric cable and to the actuator by one or two pneumatic lines. Such a split design is frequently advantageous if the ambient conditions at the fitting exceed the specified values for the positioner (e. g. strong vibrations).

The following can be used for measuring the travel or angle:

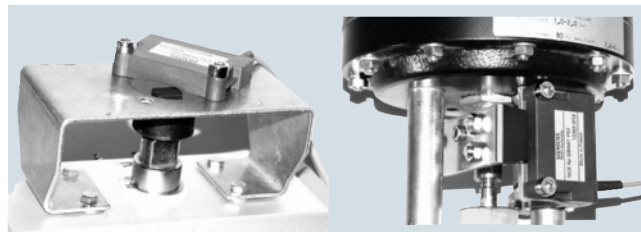
- NCS sensor
- External position detection system C73451-A430-D78
- A commercially available potentiometer (10 k Ω resistance), e. g. for higher application temperatures or customer-specific applications

The use of potentiometers is recommended for very small linear actuators with a short valve travel since, on the one hand, the space required by the potentiometer is very small and, on the other, the transmission characteristic is optimum for a small travel.



Separate mounting of position detection system and controller unit

Non contacting sensor (NCS)



NCS for part-turn actuator (6DR4004-N.10) mounted with mounting console (left) and NCS for linear actuator \leq 14 mm (0.55 inch) (6DR4004-N.20) mounted with actuator-specific mounting solution (right)



NCS (6DR4004-.N.30) for travels > 14 mm (0.55 inch) mounted using mounting kit for NAMUR linear actuator

The NCS sensor consists of a non-contacting position sensor. All coupling elements are omitted such as coupling wheel and driver pin with part-turn actuators or lever and pick-up bracket with linear actuators for up to 14 mm travel.

This results in:

- Even greater resistance to vibration and shock
- No wear of sensor
- Problem-free mounting on very small actuators
- Negligible hysteresis with very small travels.

The sensor does not require an additional power supply, i. e. SIPART PS2 (not for Ex d version) can be operated in a 2-wire system. The NCS (Non Contacting Sensor) consists of a potted sensor housing which must be mounted permanently and a magnet which is mounted on the spindle of linear actuators or on the shaft butt of part-turn actuators. For the version for travels > 14 mm (0.55 inch), the magnet and the NCS are premounted on a stainless steel frame and offer the same interface mechanically as the positioner itself, i. e. they can be mounted using the standard mounting kits 6DR4004-8V, -8VK and -8VL.

The installation of a EMC filter module in the positioner (controller unit) is necessary in order to ensure a connection level with EMC according to EC Declaration of Conformity when using external sensors (see "Selection and Ordering Data", "EMC Filter Module").

Function

The SIPART PS2 positioner works in a completely different way to normal positioners.

Mode of operation

Comparison of the setpoint and the actual value takes place electronically in a microcontroller. If the microcontroller detects a deviation, it uses a 5-way switch procedure to control the piezoelectric valves, which regulates the flow of air into and from the chambers of the pneumatic actuator or blows it in the opposite direction.

The microcontroller then outputs an electric control command to the piezoelectric valve in accordance with the size and direction of the deviation (deviation between setpoint and actual values). The piezoelectric valve converts the command into a pneumatic positional increment.

The positioner outputs a continuous signal in the area where there is a large system deviation (fast step zone); in areas of moderate system deviation (slow step zone) it outputs a sequence of pulses. No positioning signals are output in the case of a small system deviation (adaptive or variable deadband).

The linear or rotary motion of the actuator is detected by the mounting kit and transferred to a high-quality potentiometer over a shaft and a non-floating gear transmission.

The angular error of the pick-up in cases where the assembly is mounted on a linear actuator is corrected automatically.

When connected in a 2-wire system, the SIPART PS2 draws its power exclusively from the 4 to 20 mA setpoint signal. The electric power is also connected through the 2-wire bus signal with PROFIBUS operation (SIPART PS2 PA). The same applies for the FOUNDATION Fieldbus version.

Pneumatic valve manifold with piezoelectric valve precontrol

The piezoelectric valve can release very short control pulses. This helps achieve a high positioning accuracy. The pilot element is a piezoelectric bending converter which switches the pneumatic main controller unit. The valve manifold is characterized by an extremely long service life.

Local operation

Local operation is performed using the built-in display and the three buttons. Switching between the operating levels Automatic, Manual, Configuring and Diagnosis is possible at the press of a button.

In manual mode the drive can be adjusted over the entire range without interrupting the circuit.

Operation and monitoring with the SIMATIC PDM configuration software

The configuration software SIMATIC PDM permits simple operation, monitoring, configuration and parameterization of the device. The diagnostic information available can be read via SIMATIC PDM from the device. Communication is carried out via the HART protocol or PROFIBUS PA. For the HART protocol, the device can be accessed both via a HART modem and via a HART-compatible input/output module (remote IO). The corresponding device description files, such as GSD and (Enhanced) EDD are available for both types of communication.

In addition, the SITRANS DTM provides software based on tried and tested EDD technology that can be used to parameterize field devices via a DTM (Device Type Manager) using an FDT frame application (e. g. PACTware). SITRANS DTM and the necessary device-specific enhanced EDD are available for download free of charge. The software provides the relevant communication interfaces for HART and PROFIBUS.

Automatic commissioning

With a simple configuration menu the SIPART PS2 can be quickly adapted to the fitting and adjusted by means of an automatic startup function.

During initialization, the microcontroller determines the zero point, full-scale value, the direction of action and the positioning speed of the fitting. From this data it establishes the minimum pulse time and the deadband, thus optimizing the control.

Low air consumption

A hallmark of the SIPART PS2 is its own extremely low consumption of air. Normal air losses on conventional positioners are very costly. Thanks to the use of modern piezoelectric technology, the SIPART PS2 consumes air only when it is needed, which means that it pays for itself within a very short time.

Positioners

SIPART PS2

Technical description

Comprehensive monitoring functions

The SIPART PS2 has various monitoring functions with which changes on the actuator and valve can be detected and signaled if applicable when a selectable limit has been exceeded. This information may be important for diagnosis of the actuator or valve. The measuring data to be determined and monitored, some of whose limits can be adjusted, include:

- Travel integral
- Number of changes in direction
- Alarm counter
- Self-adjusting deadband
- Valve end limit position (e. g. for detection of valve seat wear or deposits)
- Operating hours (also according to temperature and travel ranges) as well as min./max. temperature
- Operating cycles of piezoelectric valves
- Valve positioning time
- Actuator leakages

At a glance with the Diagnostics Cockpit

With the Diagnostics Cockpit, the HART variants of the SIPART PS2 provide a straightforward way of getting started with the world of diagnostic capabilities. All relevant information (set-point, actual value, control deviation, status of the diagnostic system, etc.) of the valve is available at a glance. Additional facts and details are just a few mouse clicks away from the Diagnostics Cockpit.

Status monitoring with 3-stage alarm concept

The intelligent electropneumatic SIPART PS2 positioner is equipped with additional monitoring functions. The status indications derived from these monitoring functions signal active faults of the unit. The severity of these faults are graded using "traffic light signaling", symbolized by a wrench in the colors green, yellow and red (in SIMATIC PDM and Maintenance Station):

- Need for maintenance (green wrench)
- Urgent need for maintenance (yellow wrench)
- Imminent danger of unit failure or general failure (red wrench)

This allows users to put early measures into action before a serious valve or actuator fault occurs which could result in a system shutdown. The fact that a fault indication is signaled, such as the onset of a diaphragm break in the actuator or the progressive sluggishness of a unit, enables the user to ensure system reliability at any time by means of suitable maintenance strategies.

This three-stage alarm hierarchy also allows early detection and signaling of other faults, such as the static friction of a packing box, the wearing of a valve plug/seating, or precipitations or incrustations on the fittings.

These fault indications can be output either line-conducted over the alarm outputs (see above) of the positioner (max. 3), or via communication over the HART or field bus interfaces. In this case, the HART, PROFIBUS and FF versions of SIPART PS2 permit a differentiation of the various fault indications, as well as a trend representation and histogram function of all key process variables with regard to the fittings.

The device display also displays the graded maintenance requirements, complete with identification of the source of the fault.

Maintenance required for valve

The Full Stroke Test, Step Response Test, Multi Step Response Test and Valve Performance Test provide detailed information about the maintenance required of the valve. With the help of HART communication, you receive comprehensive test results and can identify the extent of the maintenance measures. In order to quantify the performance capability of valves, characteristic values such as step response times (T63, T86, user-selectable Txx), dead times, overshoot, hysteresis, errors of measurement, non-linearity, etc., are determined.

Functional safety acc. to SIL2

The positioner is suitable for use on valves that satisfy the special requirements in terms of functional safety up to SIL 2 in accordance with IEC 61508 or IEC 61511. The variants 6DR5.1.-0.....-Z C20 are available for this.

These are single-acting positioners for mounting on pneumatic actuators with spring return.

The positioner vents the valve actuator on demand/in the event of a fault and puts the valve in the preset safety position.

This positioner meets the following requirement:

- Functional safety up to SIL 2 in accordance with IEC 61508 or IEC 61511 for safe venting.

SIPART PS 2 as "intelligent solenoid valve"

Open/Close valves, safety fittings in particular, are generally pneumatically controlled over a solenoid valve. If you use SIPART PS2 instead of this type of solenoid valve, the positioner performs two tasks in a single device (without extra wiring)

- Firstly, it switches the fitting off on demand by venting the actuator (functional safety acc. to SIL 2 (see above))
- Secondly, it can perform a Partial Stroke Test at regular intervals (1 - 365 days), which prevents the blocking of the fitting, e. g. due to corrosion or furring.

As in this case SIPART PS2 is constantly working in normal operation (e. g. 99 % position), it also acts as a permanent test function for the pneumatic output circuit, which is not usually possible when using a solenoid valve.

Solenoid valves on control valves can also not normally be tested during operation. They are therefore not necessary when using SIPART PS 2 with a 4-wire connection system as the venting is carried out on demand by SIPART PS2. This means that on control valves, both the control function and the shut-off function can be carried out by a single device.

Configuring

In configuring mode, the SIPART PS2 positioner can be configured to requirements and include the following settings:

- Input current range 0 to 20 mA or 4 to 20 mA
- Rising or falling characteristic curve at the setpoint input
- Positioning speed limit (setpoint ramp)
- Splitrange operation; adjustable start-of-scale and full-scale values
- Response threshold (deadband); self-adjusting or fixed
- Direction of action; rising or falling output pressure with rising setpoint
- Limits (start-of-scale and full-scale values) of positioning range
- Limits (alarms) of the final control element position; minimum and maximum values
- Automatic "tight closing" (with adjustable response threshold)
- The travel can be corrected in accordance with the valve characteristic curve.
- Function of binary inputs
- Function of alarm output etc.

Configuration of the various SIPART PS2 versions is largely identical.

Positioners

SIPART PS2

Technical specifications

Technical specifications

SIPART PS2 (all versions)

Rated conditions		Design	
Ambient conditions	For indoor and outdoor use	• Outlet air valve (deerate actuator for fail in place version)	
Ambient temperature	In hazardous areas, observe the maximum permitted ambient temperature according to the temperature class. See "Technical Specifications" on page 5/9.	- 2 bar (29 psi)	4.3 Nm ³ /h (19.0 USgpm)
• Permitted ambient temperature for operation ¹⁾	-30 ... +80 °C (-22 ... +176 °F)	- 4 bar (58 psi)	7.3 Nm ³ /h (32.2 USgpm)
• Altitude	2 000 m above sea level. At altitudes greater than 2 000 m above sea level, use a suitable power supply.	- 6 bar (87 psi)	9.8 Nm ³ /h (43.3 USgpm)
• Relative humidity	0 ... 100 %	Valve leakage	< 6 · 10 ⁻⁴ Nm ³ /h (0.0026 USgpm)
Degree of protection ²⁾	IP66 according to IEC/EN 60529/NEMA 4X	Restrictor ratio	Adjustable up to ∞ : 1
Mounting position	Any; pneumatic connections and exhaust opening not facing up in wet environment	Auxiliary power consumption in the controlled state	< 3,6 · 10 ⁻² Nm ³ /h (0.158 USgpm)
Vibration resistance		Sound pressure	L _{Aeq} < 75 dB L _{Amax} < 80 dB
• Harmonic oscillations (sine-wave) according to EN 60068-2-6/10.2008	3.5 mm (0.14"), 2 ... 27 Hz, 3 cycles/axis 98.1 m/s ² (321.84 ft/s ²), 27 ... 300 Hz, 3 cycles/axis	Design	
• Bumping (half-sine) according to EN 60068-2-27/02.2010	150 m/s ² (492 ft/s ²), 6 ms, 1000 shocks/axis	Mode of operation	
• Noise (digitally controlled) according to EN 60068-2-64/04.2009	10 ... 200 Hz; 1 (m/s ²)/Hz (3.28 (ft/s ²)/Hz) 200 ... 500 Hz; 0.3 (m/s ²)/Hz (0.98 (ft/s ²)/Hz) 4 hours/axis	• Range of stroke (linear actuators)	3 ... 130 mm (0.12 ... 5.12 inch) (angle of positioner shaft 16 ... 90°) Larger range of stroke on request.
• Recommended continuous duty range of the complete fitting	≤ 30 m/s ² (98.4 ft/s ²) without resonance sharpness	• Angle of rotation range (part-turn actuators)	30 ... 100°
Climatic class	According to EN 60721-3-4	Mounting type	
• Storage	1K5, but -40 ... +80 °C (1K5, but -40 ... +176 °F)	• On linear actuators	Using mounting kit 6DR4004-8V and where necessary with an additional lever arm 6DR4004-8L on actuators according to IEC 60534-6-1 (NAMUR) with ribs, bars or flat face.
• Transport	2K4, but -40 ... +80 °C (2K4, but -40 ... +176 °F)	• On part-turn actuators	Using mounting kit 6DR4004-8D on actuators with mounting plane according to VDI/VDE 3845 and IEC 60534-6-2.
• Operation ¹⁾³⁾⁴⁾	4K3, but -30 ... +80 °C (4K3, but -22 ... +176 °F) ³⁾	Weight, positioner without option modules or accessories	
Pneumatic data		• 6DR5..0 Glass-fiber reinforced enclosure made from polycarbonate	Approx. 0.9 kg (1.98 lb)
Auxiliary power (air supply)	Compressed air, carbon dioxide (CO ₂), nitrogen (N), noble gases or cleaned natural gas	• 6DR5..1 Aluminum enclosure, narrow	Approx. 1.3 kg (2.86 lb)
• Pressure ⁵⁾	1.4 ... 7 bar (20.3 ... 101.5 psi)	• 6DR5..2 Stainless steel enclosure	Approx. 3.9 kg (8.6 lb)
Air quality to ISO 8573-1		• 6DR5..3 Aluminum enclosure	Approx. 1.6 kg (3.53 lb)
• Solid particulate size and density	Class 2	• 6DR5..5 Flameproof aluminum enclosure	Approx. 5.2 kg (11.46 lb)
• Pressure dew point	Class 2 (min. 20 K (36 °F) below ambient temperature)	Material	
• Oil content	Class 2	• Enclosure	
Unrestricted flow (DIN 1945)		- 6DR5..0 Makrolon	Glass-fiber reinforced polycarbonate (PC)
• Inlet air valve (ventilate actuator) ⁶⁾		- 6DR5..1 Aluminum, narrow	GD AISi12
- 2 bar (29 psi)	4.1 Nm ³ /h (18.1 USgpm)	- 6DR5..2 Stainless steel	Austenitic stainless steel 316Cb, mat. No. 1.4581
- 4 bar (58 psi)	7.1 Nm ³ /h (31.3 USgpm)	- 6DR5..3 Aluminum	GD AISi12
- 6 bar (87 psi)	9.8 Nm ³ /h (43.1 USgpm)	- 6DR5..5 Aluminum, flameproof	GK AISi12
• Outlet air valve (deerate actuator for all versions except fail in place) ⁶⁾		• Pressure gauge block	Aluminum AlMgSi, anodized
- 2 bar (29 psi)	8.2 Nm ³ /h (36.1 USgpm)	Dimensions	See "Dimensional Drawings" on page 5/22
- 4 bar (58 psi)	13.7 Nm ³ /h (60.3 USgpm)	Device versions	
- 6 bar (87 psi)	19.2 Nm ³ /h (84.5 USgpm)	• In Makrolon enclosure 6DR5..0	Single-acting and double-acting
		• In aluminum enclosure 6DR5..1	Single-acting
		• In aluminum enclosure 6DR5..3 and 6DR5..5	Single-acting and double-acting
		• In stainless steel enclosure 6DR5..2	Single-acting and double-acting

Gauge	
• Degree of protection	
- Gauge made of plastic	IP31
- Gauge made of steel	IP44
- Gauge made of stainless steel 316	IP54
• Vibration resistance	According to EN 837-1
Connections, electrical	
• Screw terminals	2.5 mm ² AWG30-14
• Cable gland	
- Without explosion protection as well as with Ex i	M20x1.5 or ½-14 NPT
- With explosion protection Ex d	Ex d certified M20x1.5; ½-14 NPT or M25x1.5
Connections, pneumatic	Female thread G¼ or ¼-18 NPT
Controller	
Controller unit	
• Five-point switch	Self-adjusting
• Deadband	
- dEbA = Auto	Self-adjusting
- dEbA = 0.1 ... 10 %	Can be set as fixed value
Analog-to-digital converter	
• Scan time	10 ms
• Resolution	≤ 0,05 %
• Transmission error	≤ 0,2 %
• Temperature influence effect	≤ 0.1 %/10 K (≤ 0.1 %/18 °F)
Certificates and approvals	
Classification according to pressure equipment directive (PED 97/23/EC)	For gases of fluid group 1, complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
CE conformity	You can find the appropriate directives and standards, including the relevant versions, in the EC Declaration of Conformity on the Internet.
Explosion protection	
Explosion protection according to ATEX/IECEX	
• Flameproof enclosure "d"	II 2 G Ex d IIC T6/T4 Gb
• Intrinsic safety "i"	II 2 G Ex ia IIC T6/T4 Gb II 3 G Ex ic IIC T6/T4 Gc II 2 D Ex ia IIIC T110°C Db
• Non-sparking "nA"	II 3 G Ex nA IIC T6/T4 Gc
• Dust, protection with "t" enclosure ⁷⁾	II 2 D Ex tb IIIC T100°C Db
Explosion protection according to FM/CSA, suitable for installations according to NEC 500/NEC 505	
• Flameproof enclosure "XP"	XP, Class I, Division 1, Gr. ABCD XP, Class I, Zone 1, AEx d, IIC, T6/T4
• Intrinsic safety "IS"	IS / I, II, III / 1 / A-G IS / 1 / AEx / Ex ib / IIC, Gb IS / 21 / AEx / Ex ib / IIIC, Db, T110°C
• Non-sparking "NI"	NI / 1 / 2 / A-D NI / 2 / AEx / Ex nA, Ex ic / IIC, Gc
• Dust, protection with "DIP" enclosure ⁷⁾	DIP / II, III / 1 / E-G DIP / 21 / AEx / Ex tb / IIIC, Db, T100°C

Permissible ambient temperatureFor operation with and without HART¹⁾³⁾

- | | |
|-----------------------------------|--|
| • 6DR501./6DR502./6DR521./6DR522. | T4: -30 ... +80 °C (-22 ... +176 °F)
T6: -30 ... +50 °C (-22 ... +122 °F) |
| • 6DR5.15/6DR5.25 | T4: -30 ... +80 °C (-22 ... +176 °F)
T6: -30 ... +50 °C (-22 ... +122 °F) |

For operation with PROFIBUS PA or with FOUNDATION Fieldbus¹⁾³⁾

- | | |
|-----------------------------------|--|
| • 6DR551./6DR552./6DR561./6DR562. | T4: -20 ... +75 °C (-4 ... +167 °F)
T6: -20 ... +50 °C (-4 ... +122 °F) |
| • 6DR5515/6DR5525/6DR5615/6DR5625 | T4: -30 ... +80 °C (-22 ... +176 °F)
T6: -30 ... +50 °C (-22 ... +122 °F) |

Natural gas as driving medium

For technical specifications using natural gas as driving medium, see operating instructions.

- 1) The following applies to fail in place:
Without explosion protection: -20 ... +60 °C (-4 ... +140 °F)
With explosion protection:
T4: -20 ... +60 °C (-4 ... +140 °F)
T6: -20 ... +50 °C (-4 ... +122 °F)
- 2) Max. impact energy 1 Joule for enclosure with inspection window 6DR5..0 and 6DR5..1 or max. 2 Joule for 6DR5..3.
- 3) At ≤ -10 °C (≤ 14 °F) the display refresh rate of the indicator is limited. When using position feedback module, only T4 is permitted.
- 4) -20 ... +80 °C (-4 ... +176 °F) for 6DR55..-0G..., 6DR56..-0G..., 6DR55..-0D... and 6DR56..-0D...
- 5) The following applies to fail in place: 3 ... 7 bar (43.5 ... 101.5 psi).
- 6) With Ex d version (6DR5..5-...) values are reduced by approx. 20 %.
- 7) For aluminum enclosure, narrow, single-acting, without inspection window 6DR5..1-.D...-.A.-Z...
For stainless steel enclosure, 6DR5..2-.D...-.A.-Z...
For aluminum enclosure, with inspection window 6DR5..3-.K...-.A.-Z...

Positioners

SIPART PS2

Technical specifications

SIPART PS2 with and without HART

	Basic device without Ex protection	Basic device with Ex d explosion protection	Basic device with "ia" explosion protection	Basic device with explosion protection "ic", "nA", "t"
Electrical specifications				
Current input I_W				
• Rated signal range			0/4 ... 20 mA	
• Test voltage			840 V DC, 1 s	
• Binary input BE1 (terminals 9/10; electrically connected to the basic device)		Suitable only for floating contact; max. contact load < 5 μ A at 3 V		
2-wire connection (terminals 6/8) 6DR50.. and 6DR53.. without HART 6DR51.. and 6DR52.. with HART				
Current to maintain the auxiliary power supply		≥ 3.6 mA		
Required load voltage U_B (corresponds to Ω at 20mA)				
• Without HART (6DR50..)				
- Typical	6.36 V (= 318 Ω)	6.36 V (= 318 Ω)	7.8 V (= 390 Ω)	7.8 V (= 390 Ω)
- max.	6.48 V (= 324 Ω)	6.48 V (= 324 Ω)	8.3 V (= 415 Ω)	8.3 V (= 415 Ω)
• Without HART (6DR53..)				
- Typical	7.9 V (= 395 Ω)	-	-	-
- max.	8.4 V (= 420 Ω)	-	-	-
• With HART (6DR51..)				
- Typical	6.6 V (= 330 Ω)	6.6 V (= 330 Ω)	-	-
- max.	6.72 V (= 336 Ω)	6.72 V (= 336 Ω)	-	-
• With HART (6DR52..)				
- Typical	-	8.4 V (= 420 Ω)	8.4 V (= 420 Ω)	8.4 V (= 420 Ω)
- max.	-	8.8 V (= 440 Ω)	8.8 V (= 440 Ω)	8.8 V (= 440 Ω)
• Static destruction limit	± 40 mA	± 40 mA	-	-
Effective internal capacitance C_i				
• Without HART	-	-	11 nF	"ic": 11 nF
• With HART	-	-	11 nF	"ic": 11 nF
Effective internal inductance L_i				
• Without HART	-	-	207 μ H	"ic": 207 μ H
• With HART	-	-	310 μ H	"ic": 310 μ H
For connecting to circuits with the following peak values	-	-	$U_i = 30$ V $I_i = 100$ mA $P_i = 1$ W	"ic": $U_i = 30$ V $I_i = 100$ mA "nA"/"t": $U_n \leq 30$ V $I_n \leq 100$ mA
3-/4-wire connection (terminals 2/4 and 6/8) 6DR52.. with HART, explosion-protected 6DR53.. without HART, not explosion-protected)				
Load voltage at 20 mA	≤ 0.2 V (= 10 Ω)	≤ 0.2 V (= 10 Ω)	≤ 1 V (= 50 Ω)	≤ 1 V (= 50 Ω)
Power supply U_H	18 ... 35 V DC	18 ... 35 V DC	18 ... 30 V DC	18 ... 30 V DC
Current consumption I_H			$(U_H - 7.5 \text{ V})/2.4 \text{ k}\Omega$ [mA]	
Effective internal capacitance C_i	-	-	22 nF	"ic": 22 nF
Effective internal inductance L_i	-	-	0.12 mH	"ic": 0,12 mH
For connecting to circuits with the following peak values	-	-	$U_i = 30$ V DC $I_i = 100$ mA $P_i = 1$ W	"ic": $U_i = 30$ V $I_i = 100$ mA "nA"/"t": $U_n \leq 30$ V $I_n \leq 100$ mA
Electrical isolation	between U_H and I_W	between U_H and I_W	between U_H and I_W (2 intrinsically safe circuits)	between U_H and I_W
HART communication				
HART version			7	
PC parameterization software	SIMATIC PDM; supports all device objects. The software is not included in the scope of delivery.			

SIPART PS2 with PROFIBUS PA/with FOUNDATION Fieldbus

	Basic device without Ex protection	Basic device with Ex d explosion protection	Basic device with "ia" explosion protection	Basic device with explosion protection "ic", "nA", "t"
Electrical specifications				
<u>Power supply, bus circuit (terminals 6/7)</u>	Bus-supplied			
Bus voltage	9 ... 32 V	9 ... 32 V	9 ... 24 V	9 ... 32 V
For connecting to circuits with the following peak values				
• Bus connection with FISCO supply unit			$U_i = 17.5 \text{ V}$ $I_i = 380 \text{ mA}$ $P_i = 5.32 \text{ W}$	"ic": $U_i = 17.5 \text{ V}$ $I_i = 570 \text{ mA}$ "nA"/"t": $U_n \leq 32 \text{ V}$
• Bus connection with barrier			$U_i = 24 \text{ V}$ $I_i = 250 \text{ mA}$ $P_i = 1.2 \text{ W}$	"ic": $U_i = 32 \text{ V}$ "nA"/"t": $U_n \leq 32 \text{ V}$
Effective internal capacitance	-	-	$C_i = \text{negligible}$	$C_i = \text{negligible}$
Effective internal inductance	-	-	$L_i = 8 \mu\text{H}$	"ic": $L_i = 8 \mu\text{H}$
Current consumption			11.5 mA \pm 10 %	
Additional error signal			0 mA	
<u>Safety shutdown can be activated with coding bridge (terminals 8/1/8/2)</u>			electrically isolated from bus circuit and binary input	
• Input resistance			> 20 k Ω	
• Signal state "0" (shutdown active)			0 ... 4.5 V or unconnected	
• Signal state "1" (shutdown not active)			13 ... 30 V	
For connecting to power supply with the following peak values				
• Effective Internal capacitance	-	-	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$	"nA": $U_n \leq 30 \text{ V}$ $I_n \leq 100 \text{ mA}$ "ic": $U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $C_i = \text{negligibly small}$
Binary input BE1 for PROFIBUS (terminals 9/10); electrically connected to the bus circuit)			Bridged or connection to switching contact. Suitable only for floating contact; max. contact load < 5 μA at 3 V	
Electrical isolation				
• For basic device without Ex protection and for basic device with Ex d	Electrical isolation between basic device and the input for safety shutdown, as well as the outputs of the option modules			
• For basic device Ex "ia"	The basic device and the input to the safety shutdown, as well as the outputs of the option modules, are separate, intrinsically safe circuits.			
• For basic device Ex "ic", "nA", "t"	Electrical isolation between basic device and the input for safety shutdown, as well as the outputs of the option modules			
Test voltage			840 V DC, 1 s	
PROFIBUS PA communication				
Communication	Layers 1 and +2 according to PROFIBUS PA, transmission technology according to IEC 61158-2; slave function; layer 7 (protocol layer) according to PROFIBUS DP, EN 50170 standard with the extended PROFIBUS functions (all data acyclic, manipulated variable, feedbacks and status also cyclic)			
C2 connections	Four connections to master class 2 are supported; automatic connection setup 60 s after break in communication			
Device profile	PROFIBUS PA profile B, version 3.0, more than 150 objects			
Response time to master message	Typically 10 ms			
Device address	126 (when delivered)			
PC parameterization software	SIMATIC PDM; supports all device objects. The software is not included in the scope of delivery.			

Positioners

SIPART PS2

Technical specifications

	Basic device without Ex protection	Basic device with Ex d explosion protection	Basic device with "ia"explosion protection	Basic device with explo- sion protection "ic", "nA", "t"
FOUNDATION Fieldbus communication				
Communications group and class	According to technical specification of the Fieldbus Foundation for H1 communication			
Function blocks	Group 3, Class 31PS (Publisher Subscriber) 1 Resource Block (RB2) 1 Analog Output Function Block (AO) 1 PID Function Block (PID) 1 Transducer Block (Standard Advanced Positioner Valve)			
Execution times of the blocks	AO: 60 ms PID: 80 ms			
Physical layer profile	123, 511			
FF registration	Tested with ITK 5.0			
Device address	22 (when delivered)			

Option modules

	Without Ex protection/ with Ex protection Ex d	With explosion protection "ia"	With explosion protection "ic", "nA", "t"
Alarm module	6DR4004-8A	6DR4004-6A	6DR4004-6A
3 binary output circuits		<ul style="list-style-type: none"> Alarm output A1: Terminals 41 and 42 Alarm output A2: Terminals 51 and 52 Alarm output: Terminals 31 and 32 	
<ul style="list-style-type: none"> Power supply U_H Signal state <ul style="list-style-type: none"> - High (not activated) - Low *) (activated) 	≤ 35 V Conductive, $R = 1$ k Ω , +3/-1 % *) Blocked, $I_R < 60$ μ A	-	-
*) Low is also the status when the basic device is faulty or is without additional electrical power supply.	*) When used in the flameproof enclosure the current consumption must be limited to 10 mA per output.	Switching threshold with supply to EN 60947-5-6: $U_H = 8.2$ V, $R_i = 1$ k Ω	Switching threshold with supply to EN 60947-5-6: $U_H = 8.2$ V, $R_i = 1$ k Ω
<ul style="list-style-type: none"> For connecting to circuits with the following peak values 	-	$U_i = 15$ V $I_i = 25$ mA $P_i = 64$ mW	"ic": $U_i = 15$ V $I_i = 25$ mA "nA"/"t": $U_n \leq 15$ V
Effective internal capacitance	-	$C_i = 5.2$ nF	$C_i = 5.2$ nF
Effective internal inductance	-	$L_i =$ negligibly small	$L_i =$ negligibly small
1 binary output circuit		Binary input BE2: Terminals 11 and 12, terminals 21 and 22 (bridge)	
<ul style="list-style-type: none"> Electrically connected to the basic device <ul style="list-style-type: none"> - Signal state 0 - Signal state 1 - Contact load 		Floating contact, open Floating contact, closed 3 V, 5 μ A	
<ul style="list-style-type: none"> Electrically isolated from the basic device <ul style="list-style-type: none"> - Signal state 0 - Signal state 1 - Natural resistance 		≤ 4.5 V or open ≥ 13 V ≥ 25 k Ω	
<ul style="list-style-type: none"> Static destruction limit 	± 35 V	-	-
<ul style="list-style-type: none"> For connecting to circuits with the following peak values 	-	$U_i = 25.2$ V	"ic": $U_i = 25.2$ V "nA"/"t": $U_n \leq 25.5$ V
Effective internal capacitance	-	$C_i =$ negligibly small	$C_i =$ negligibly small
Effective internal inductance	-	$L_i =$ negligibly small	$L_i =$ negligibly small
Electrical isolation		The 3 outputs, the input BE2 and the basic device are electrically isolated from each other	
Test voltage		840 V DC, 1 s	
Position feedback module	6DR4004-8J	6DR4004-6J	6DR4004-6J
DC output for position feedback		2-wire connection	
1 current output: Terminals 61 and 62		4 ... 20 mA, short-circuit proof	
Rated signal range		3.6 ... 20.5 mA	
Total operating range			
Power supply U_H	+12 ... +35 V	+12 ... +30 V	+12 ... +30 V
External loads R_B [k Ω]		$\leq (U_H [V] - 12 V)/I$ [mA]	
Transmission error		$\leq 0,3$ %	
Temperature influence effect		≤ 0.1 %/10 K (≤ 0.1 %/18 °F)	
Resolution		$\leq 0,1$ %	
Residual ripple		≤ 1 %	
<ul style="list-style-type: none"> For connecting to circuits with the following peak values 	-	$U_i = 30$ V $I_i = 100$ mA $P_i = 1$ W	"ic": $U_i = 30$ V, $I_i = 100$ mA "nA"/"t": $U_n \leq 30$ V, $I_n \leq 100$ mA $P_n \leq 1$ W
Effective internal capacitance	-	$C_i = 11$ nF	$C_i = 11$ nF
Effective internal inductance	-	$L_i =$ negligibly small	$L_i =$ negligibly small
Electrical isolation		Electrically isolated from the alarm option and safely isolated from the basic device	
Test voltage		840 V DC, 1 s	

Positioners

SIPART PS2

Technical specifications

	Without Ex protection	With explosion protection "ia"	With explosion protection "ic", "nA", "t"
SIA module	6DR4004-8G	6DR4004-6G	6DR4004-6G
Limit transmitter with slot-type initiators and alarm output			
2 slot-type initiators		<ul style="list-style-type: none"> Binary output (limit transmitter) A1: Terminals 41 and 42 Binary output (limit transmitter) A2: Terminals 51 and 52 	
<ul style="list-style-type: none"> Connection Signal state High (not activated) Signal state Low (activated) 2 slot-type initiators Function Connecting to circuits with the following peak values 	2-wire system to EN 60947-5-6 (NAMUR), for switching amplifier to be connected on load side	$> 2.1 \text{ mA}$ $< 1.2 \text{ mA}$ Type SJ2-SN NC (normally closed)	
Effective internal capacitance	-	$C_i = 41 \text{ nF}$	$C_i = 41 \text{ nF}$
Effective internal inductance	-	$L_i = 100 \mu\text{H}$	$L_i = 100 \mu\text{H}$
1 alarm output		Binary output: Terminals 31 and 32	
<ul style="list-style-type: none"> Connection Signal state High (not activated) Signal state Low (activated) Power supply U_H Connecting to circuits with the following peak values 	On switching amplifier according to EN 60947-5-6: (NAMUR), $U_H = 8.2 \text{ V}$, $R_i = 1 \text{ k}\Omega$.		
	$R = 1.1 \text{ k}\Omega$	$> 2.1 \text{ mA}$	$> 2.1 \text{ mA}$
	$R = 10 \text{ k}\Omega$	$< 1.2 \text{ mA}$	$< 1.2 \text{ mA}$
	$U_H \leq 35 \text{ V DC}$ $I \leq 20 \text{ mA}$	-	-
	-	$U_i = 15 \text{ V}$ $I_i = 25 \text{ mA}$ $P_i = 64 \text{ mW}$	"ic": $U_i = 15 \text{ V}$ $I_i = 25 \text{ mA}$ "nA": $U_n \leq 15 \text{ V}$ $P_n \leq 64 \text{ mW}$
Effective internal capacitance	-	$C_i = 5.2 \text{ nF}$	$C_i = 5.2 \text{ nF}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
Electrical isolation		The 3 outputs are electrically isolated from the basic device.	
Test voltage		840 V DC, 1 s	

	Without Ex protection	With explosion protection "ia"	With explosion protection "ic", "nA", "t"
Mechanical limit switch module	6DR4004-8K	6DR4004-6K	6DR4004-6K
Limit transmitter with mechanical switching contacts			
2 limit value contacts		<ul style="list-style-type: none"> Binary output A1: Terminals 41 and 42 Binary output A2: Terminals 51 and 52 	
<ul style="list-style-type: none"> Max. switching current AC/DC 	4 A	-	-
<ul style="list-style-type: none"> Connecting to circuits with the following peak values 	-	$U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ $P_i = 750\text{ mW}$	"ic": $U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ "nA": $U_n \leq 15\text{ V}$
Effective internal capacitance	-	$C_i = \text{negligibly small}$	$C_i = \text{negligibly small}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
<ul style="list-style-type: none"> Max. switching voltage AC/DC 	250 V/24 V	30 V DC	30 V DC
1 alarm output		Binary output: Terminals 31 and 32	
<ul style="list-style-type: none"> Connection 	On switching amplifier according to EN 60947-5-6: (NAMUR), $U_H = 8.2\text{ V}$, $R_i = 1\text{ k}\Omega$.		-
<ul style="list-style-type: none"> Signal state High (not activated) 	$R = 1.1\text{ k}\Omega$	$> 2.1\text{ mA}$	$> 2.1\text{ mA}$
<ul style="list-style-type: none"> Signal state Low (activated) 	$R = 10\text{ k}\Omega$	$< 1.2\text{ mA}$	$< 1.2\text{ mA}$
<ul style="list-style-type: none"> Auxiliary power 	$U_H \leq 35\text{ V DC}$ $I \leq 20\text{ mA}$	-	-
<ul style="list-style-type: none"> Connecting to circuits with the following peak values 	-	$U_i = 15\text{ V}$ $I_i = 25\text{ mA}$ $P_i = 64\text{ mW}$	"ic": $U_i = 15\text{ V}$ $I_i = 25\text{ mA}$
Effective internal capacitance	-	$C_i = 5.2\text{ nF}$	$C_i = 5.2\text{ nF}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
Electrical isolation		The 3 outputs are electrically isolated from the basic device	
Test voltage		3 150 V DC, 2 s	
Rated conditions altitude	Max. 2 000 m NN At altitudes over 2 000 m NN, use a suitable power supply	-	-
EMC filter module	EMC filter module type C73451-A430-D23 is required for NCS sensor or an external potentiometer. External position sensor (potentiometer or NCS; as option) with the following peak values		
Resistance of external potentiometer	10 k Ω		
Peak values when supplied via the PROFIBUS basic device	-	$U_o = 5\text{ V}$ $I_o = 75\text{ mA}$ statisch $I_o = 160\text{ mA}$ kurzfristig $P_o = 120\text{ mW}$	$U_o = 5\text{ V}$ $I_o = 75\text{ mA}$ - $P_o = 120\text{ mW}$
Peak values when supplied via other basic devices	-	$U_o = 5\text{ V}$ $I_o = 100\text{ mA}$ $P_o = 33\text{ mW}$ $C_o = 1\text{ }\mu\text{F}$ $L_o = 1\text{ mH}$	$U_o = 5\text{ V}$ $I_o = 75\text{ mA}$ $P_o = 120\text{ mW}$ $C_o = 1\text{ }\mu\text{F}$ $L_o = 1\text{ mH}$
Electrical isolation		Electrically connected to the basic device	

Positioners

SIPART PS2

Technical specifications

	Without Ex protection	With explosion protection "ia"	With explosion protection "ic", "nA", "t"
NCS sensor			
Position range			
• Linear actuator 6DR4004-.N.20		3 ... 14 mm (0.12 ... 0.55")	
• Linear actuator 6DR4004-.N.30		10 ... 130 mm (0.39 ... 5.12"); up to 200 mm (7.87") on request	
• Part-turn actuator		30° ... 100°	
Linearity (after correction by positioner)			
• Linear actuator		± 1 %	
• Part-turn actuator		± 1 %	
Hysteresis		± 0,2 %	
Continuous working temperature	-40 °C ... +90 °C (-40 °F ... +194 °F)	-	-
Climatic class		Nach DIN EN 60721-3-4	
• Storage		1K5, but -40 ... +90 °C (1K5, but -40 ... +176 °F)	
• Transport		2K4, but -40 ... +90 °C (2K4, but -40 ... +176 °F)	
Vibration resistance			
• Harmonic oscillations (sine) according to IEC 60068-2-6		3.5 mm (0.14"), 2 ... 27 Hz; 3 cycles/axis 98.1 m/s ² (321.84 ft/s ²), 27 ... 300 Hz, 3 cycles/axis	
• Bumping according to IEC 60068-2-29		300 m/s ² (984 ft/s ²), 6 ms, 4 000 shocks/axis	
Degree of protection of enclosure		IP68 according to IEC EN 60529; NEMA 4X / Encl. Type 4X	
• Connecting to circuits with the following peak values	-	U _i = 5 V I _i = 160 mA P _i = 120 mW	"ic"/"nA": U _i = 5 V
Effective internal capacitance	-	C _i = 180 nF	C _i = 180 nF
Effective internal inductance	-	L _i = 922 µH	L _i = 922 µH
Explosion protection according to ATEX/IECEX	-	Intrinsic safety "ia": II 2 G Ex ia IIC T6/T4 Gb	Intrinsic safety "ic": II 3 G Ex ic IIC T6/T4 Gc Non-sparking "nA": II 3 G Ex nA IIC T6/T4 Gc
Explosion protection according to FM	-	Intrinsic safety "ia": IS, Class I, Division 1, ABCD IS, Class I, Zone 1, AEx ib, IIC	Non-sparking, "nA": NI, Class I, Division 2, ABCD NI, Class I, Zone 2, AEx nA, IIC
Permissible ambient temperature			
• ATEX/IECEX	-		T4: -40 ... +90 °C (-40 ... +194 °F) T6: -40 ... +70 °C (-40 ... +158 °F)
• FM	-		T4: -40 ... +85 °C (-40 ... +185 °F) T6: -40 ... +70 °C (-40 ... +158 °F)

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
SIPART PS2 electropneumatic positioner in enclosure made of Makrolon, aluminum and stainless steel	6 DR 5		SIPART PS2 electropneumatic positioner in enclosure made of Makrolon, aluminum and stainless steel	6 DR 5	
<ul style="list-style-type: none"> Click on the Article No. for the online configuration in the PIA Life Cycle Portal. 					
Version			Limit monitor		
2-wire (4 to 20 mA)			Installed, incl. 2nd cable gland		
• Without HART	0		Without	0	
• With HART, not explosion-protected	1		Alarm module; electronic (6DR4004-.A)	1	
2-, 3-, 4-wire (0/4 to 20 mA)			SIA module; slot-type initiators (6DR4004-.G)	2	
• With HART, explosion-protected	2		Mechanical limit switch module (mechanical switching contacts (6DR4004-.K))	3	
• Without HART, not explosion-protected	3				
PROFIBUS PA connection	5		Option modules		
FOUNDATION Fieldbus connection	6		Installed, incl. 2nd cable gland		
			Without	0	
For actuator			Position feedback module for position feedback signal (4 ... 20 mA) (6DR4004-.J)	1	
Single-acting	1		EMC filter module for external position sensor in the SIPART PS2 enclosure (C73451-A430-D23), NCS sensor 6DR4004-.N..0 and external position sensing with non-Siemens potentiometer	2	
Double-acting	2		Position feedback module and EMC filter module for external position sensor	3	
Enclosure					
Makrolon	0		Customer-specific design		
Aluminum, narrow; only single-acting	1 1		Without	0	
Stainless steel, without inspection window	2		Brief instructions		
Aluminum	3		German/English	A	
			French/Spanish/Italian	B	
Explosion protection			Mounted pressure gauge block		
Without		N	Without	0	
With protection type		E	<u>Gauge made of plastic</u>		
• Intrinsic safety			Block made of aluminum, single-acting G ¹ / ₄ , scaled in MPa and bar	1	
With protection type ¹⁾		D	Block made of aluminum, double-acting G ¹ / ₄ , scaled in MPa and bar	2	
• Non-sparking			Block made of aluminum, single-acting 1/4-18 NPT, scaled in MPa and psi	3	
• Dust protection via enclosure			Block made of aluminum, double-acting 1/4-18 NPT, scaled in MPa and psi	4	
With protection type ²⁾		F	<u>Gauge made of steel</u>		
• Intrinsic safety			block made of aluminum, single-acting G ¹ / ₄ , scaled in MPa, bar, psi	9	R 1 A
• Non-sparking			Block made of aluminum, double-acting G ¹ / ₄ , scaled in MPa, bar, psi	9	R 2 A
With protection type ²⁾		G	Block made of aluminum, single-acting 1/4-18 NPT, scaled in MPa, bar, psi	9	R 1 B
• Intrinsic safety			Block made of aluminum, double-acting 1/4-18 NPT, scaled in MPa, bar, psi	9	R 2 B
• Non-sparking			<u>Gauge made of stainless steel 316</u>		
With protection type ¹⁾		K	Block made of stainless steel 316, single-acting G ¹ / ₄ , scaled in MPa, bar, psi	9	R 1 C
• Intrinsic safety			Block made of stainless steel 316, double-acting G ¹ / ₄ , scaled in MPa, bar, psi	9	R 2 C
• Non-sparking			Block made of stainless steel 316, single-acting 1/4-18 NPT, scaled in MPa, bar, psi	9	R 1 D
• Dust protection via enclosure			Block made of stainless steel 316, double-acting 1/4-18 NPT, scaled in MPa, bar, psi	9	R 2 D
Connection thread electrical/pneumatic					
M20x1.5/G ¹ / ₄		G			
1/2-14 NPT / 1/4-18 NPT		N			
M20x1.5/1/4-18 NPT		M			
1/2-14 NPT / G ¹ / ₄		P			
Plug M12 / G ¹ / ₄ ³⁾		R			
Plug M12 / 1/4-18 NPT ³⁾		S			
► Available ex stock					
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.					
1) Enclosure: aluminum narrow 6DR5..1 or stainless steel 6DR5..2, each without inspection window in the cover. Aluminum 6DR5..3 with inspection window in the cover and max. impact energy 2 Joule.					
2) Enclosure: aluminum or Makrolon, each with inspection window in the cover. Max. impact energy 1 Joule for enclosure with inspection window 6DR5..0 and 6DR5..1 or max. 2 Joule for 6DR5..3.					
3) Connector M12 mounted and electrically connected in versions 6DR55.. and 6DR56.. Connector M12 mounted in versions 6DR50.., 6DR51.., 6DR52.. and 6DR53.. Not for protection type "dust protection by enclosure" 6DR5...0D... and 6DR5...0K...					

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
SIPART PS2 electropneumatic positioner, in flameproof aluminum enclosure, without cable gland	6 DR 5		SIPART PS2 electropneumatic positioner, in flameproof aluminum enclosure, without cable gland	6 DR 5	
<p>Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Version 2-wire (4 to 20 mA) • Without HART • With HART 2-, 3-, 4-wire (0/4 to 20 mA) • With HART • Without HART PROFIBUS PA connection FOUNDATION Fieldbus connection</p> <p>For actuator Single-acting Double-acting</p> <p>Connection thread electrical/pneumatic M20 x 1.5 / G¼ ½-14 NPT / ¼-18 NPT M20 x 1.5 / ¼-18 NPT ½-14 NPT / G¼ M25x1.5 / G¼</p> <p>Limit monitor Built-in Without Alarm module; electronic (6DR4004-8A)</p> <p>Option modules Built-in Without Position feedback module for position feedback signal (4 ... 20 mA) (6DR4004-8J) EMC filter module for external position sensor Position feedback module and EMC filter module for external position sensor</p> <p>Brief instructions German/English French/Spanish/Italian</p> <p>Available ex stock</p> <p>We can offer shorter delivery times for configurations designated with the Quick Ship Symbol. For details see page 9/5 in the appendix.</p>	<p>5 - 0 E</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>5</p> <p>6</p> <p>1</p> <p>2</p> <p>G</p> <p>N</p> <p>M</p> <p>P</p> <p>Q</p> <p>0</p> <p>1</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>A</p> <p>B</p>		<p>Mounted pressure gauge block Without Gauge made of plastic, block made of aluminum, single-acting G¼, scaled in MPa and bar Gauge made of plastic, block made of aluminum, double-acting G¼, scaled in MPa and bar Gauge made of plastic, block made of aluminum, single-acting ¼-18 NPT, scaled in MPa and psi Gauge made of plastic, block made of aluminum, double-acting ¼-18 NPT, scaled in MPa and psi <u>Gauge made of steel</u> Block made of aluminum, single-acting G¼, scaled in MPa, bar, psi Block made of aluminum, double-acting G¼, scaled in MPa, bar, psi Block made of aluminum, single-acting ¼-18 NPT, scaled in MPa, bar, psi Block made of aluminum, double-acting ¼-18 NPT, scaled in MPa, bar, psi <u>Gauge made of stainless steel 316</u> Block made of stainless steel 316, single-acting G¼, scaled in MPa, bar, psi Block made of stainless steel 316, double-acting G¼, scaled in MPa, bar, psi Block made of stainless steel 316, single-acting ¼-18 NPT, scaled in MPa, bar, psi Block made of stainless steel 316, double-acting ¼-18 NPT, scaled in MPa, bar, psi</p> <p>Further designs Add "-Z" to Article No. and specify Order Code.</p> <p>TAG plate made of stainless steel, 3-line Text line 1: Plain text from Y17 Text line 2: Plain text from Y15 Text line 3: Plain text from Y16</p> <p>Functional safety (SIL 2) only for 6DR5.1. (single-action positioners) Device suitable for use according to IEC 61508 and IEC 61511</p> <p>Fail in Place Holding function in case of auxiliary electrical power failure</p> <p>Measuring point description Max. 16 characters for HART, max. 32 characters for PROFIBUS PA and FOUNDATION Fieldbus, specify in plain text: Y15:</p> <p>Measuring point text Max. 24 characters for HART, max. 32 characters for PROFIBUS PA and FOUNDATION Fieldbus, specify in plain text: Y16:</p> <p>Measuring point number (TAG No.) Max. 32 characters, specify in plain text: Y17:</p> <p>Preset bus address Specify in plain text: Y25: (only for 6DR55.. and 6DR56..)</p> <p>Available ex stock</p>	<p>5 - 0 E</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>9 R 1 A</p> <p>9 R 2 A</p> <p>9 R 1 B</p> <p>9 R 2 B</p> <p>9 R 1 C</p> <p>9 R 2 C</p> <p>9 R 1 D</p> <p>9 R 2 D</p> <p>Order code</p> <p>A20</p> <p>C20</p> <p>F01</p> <p>Y15</p> <p>Y16</p> <p>Y17</p> <p>Y25</p>	

Positioners

SIPART PS2

Selection and Ordering data Accessories/Spare parts

Selection and ordering data	Article No.
Accessories	
Position feedback module for position feedback signal (4 ... 20 mA)	
• Without explosion protection	▶ 6DR4004-8J
• With explosion protection ATEX/IECEX	▶ 6DR4004-6J
• With explosion protection FM/CSA	6DR4004-7J
Alarm module for 3 alarm outputs and 1 binary input (functionality: 2 limit monitors, 1 fault alarm, 1 binary input)	
• Without explosion protection	▶ 6DR4004-8A
• With explosion protection ATEX/IECEX	▶ 6DR4004-6A
• With explosion protection FM/CSA	6DR4004-7A
SIA module (slot-type initiator alarm module, not for Ex d version)	
• Without explosion protection	▶ 6DR4004-8G
• With ATEX/IECEX and FM/CSA explosion protection	▶ 6DR4004-6G
Mechanical limit switch module (with mechanical ground contacts, not for Ex d version)	
• Without explosion protection	▶ 6DR4004-8K
• With explosion protection	▶ 6DR4004-6K
EMC filter module with and without explosion protection for connection of external position sensor (10 kΩ) or NCS sensor	▶ C73451-A430-D23
▶ Available ex stock	

Selection and ordering data	Article No.
External position detection system (with explosion protection to ATEX/IECEX) for separate mounting of position sensor and controller unit (not for Ex d version), comprising SIPART PS2 Makrolon enclosure with integral potentiometer and sliding clutch (without electronics and valve block)	▶ C73451-A430-D78
The EMC filter module is additionally required for the controller unit. (separate ordering item, see above).	
Gauge block with	
2 gauges made of plastic, block made of aluminum, single-acting G $\frac{1}{4}$, scaled in MPa and bar	▶ 6DR4004-1M
3 gauges made of plastic, block made of aluminum, double-acting G $\frac{1}{4}$, scaled in MPa and bar	▶ 6DR4004-2M
2 gauges made of plastic, block made of aluminum, single-acting $\frac{1}{4}$ -18 NPT, scaled in MPa and psi	▶ 6DR4004-1MN
3 gauges made of plastic, block made of aluminum, double-acting $\frac{1}{4}$ -18 NPT, scaled in MPa and psi	▶ 6DR4004-2MN
2 gauges made of steel Block made of aluminum, single-acting G $\frac{1}{4}$, scaled in MPa, bar, psi	▶ 6DR4004-1P
3 gauges made of steel Block made of aluminum, double-acting G $\frac{1}{4}$, scaled in MPa, bar, psi	▶ 6DR4004-2P
2 gauges made of steel Block made of aluminum, single-acting $\frac{1}{4}$ -18 NPT, scaled in MPa, bar, psi	▶ 6DR4004-1PN
3 gauges made of steel Block made of aluminum, double-acting $\frac{1}{4}$ -18 NPT, scaled in MPa, bar, psi	▶ 6DR4004-2PN
2 gauges made of stainless steel 316 Block made of stainless steel 316, single-acting G $\frac{1}{4}$, scaled in MPa, bar, psi	▶ 6DR4004-1Q
3 gauges made of stainless steel 316 Block made of stainless steel 316, double-acting G $\frac{1}{4}$, scaled in MPa, bar, psi	▶ 6DR4004-2Q
2 gauges made of stainless steel 316 Block made of stainless steel 316, single-acting $\frac{1}{4}$ -18 NPT, scaled in MPa, bar, psi	▶ 6DR4004-1QN
3 gauges made of stainless steel 316 Block made of stainless steel 316, double-acting $\frac{1}{4}$ -18 NPT, scaled in MP, bar, psi	▶ 6DR4004-2QN
Pneumatic terminal block made of stainless steel 316	
to replace the pneumatic terminal block made of aluminum for SIPART PS2 with Makrolon enclosure	
Single-acting with G $\frac{1}{4}$	▶ 6DR4004-1R
Double-acting with G $\frac{1}{4}$	▶ 6DR4004-2R
Single-acting with $\frac{1}{4}$ -18 NPT	▶ 6DR4004-1RN
Double-acting with $\frac{1}{4}$ -18 NPT	▶ 6DR4004-2RN
Mounting kit for NAMUR part-turn actuators	
(VDI/VDE 3845, with plastic coupling wheel, without mounting console)	▶ 6DR4004-8D
(VDI/VDE 3845, with stainless steel coupling, without mounting console)	▶ TGX:16300-1556
The following mounting consoles can be used with the NAMUR part-turn actuator mounting kit 6DR4004-8D. Size W x L x H (H = height of shaft butt)	
• 30 x 80 x 20 mm	▶ TGX:16152-105
• 30 x 80 x 30 mm	▶ TGX:16300-147
• 30 x 130 x 30 mm	▶ TGX:16300-149
• 30 x 130 x 50 mm	▶ TGX:16300-151

Selection and ordering data	Article No.
Accessories	
NCS sensor for non-contacting detection of position (not for Ex d version)	6DR4004-N0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Explosion protection	
Not explosion-proof	8
With protection type (ATEX/IECEX/FM)	6
• Intrinsic safety	
• Non-sparking	
Cable length	
6 m (19.68 ft)	N
20 m (65.67 ft)	P
40 m (131.23 ft)	R
Actuator type	
For part-turn actuators, glass fiber-reinforced polyester magnet holders ¹⁾	1
For linear actuators up to 14 mm (0.55 inch) ²⁾	2
For linear actuators > 14 ... 130 mm (0.55 ... 5.12 inch) ³⁾	3
For part-turn actuators, anodized aluminum magnet holders	4
¹⁾ Fitted with mounting console, available for order separately as accessory. ²⁾ Mounted with individual mounting solution. Only a NAMUR mounting bracket can be used as mounting base (order separately as accessory). ³⁾ Mounted with NAMUR interface. Article No. either 6DR4004-8V or 6DR4004-8V + 6DR4004-8L depending on stroke range. Or mounted without NAMUR interface, individual mounting solution. Article No. 6DR4004-8VK or 6DR4004-8VL can be used as individual mounting solution depending on the stroke range.	

Selection and Ordering data Accessories/Spare parts

Mounting kit for other part-turn actuators

The following mounting consoles can be used together with the NAMUR part-turn actuator mounting kit 6DR4004-8D.

- SPX (DEZURIK) Power Rac, sizes R1, R1A, R2 and R2A ▶ **TGX:16152-328**
- Masoneilan Camflex II ▶ **TGX:16152-350**
- Fisher 1051/1052/1061, sizes 30, 40, 60 to 70 ▶ **TGX:16152-364**
- Fisher 1051/1052, size 33 ▶ **TGX:16152-348**

Mounting kit for NAMUR linear actuators

- NAMUR linear actuator mounting kit with short lever (2 ... 35 mm (0.08 ... 1.38 inch)) ▶ **6DR4004-8V**
- Long lever for travels from 35 ... 130 mm (1.38 ... 5.12 inch) without NAMUR mounting bracket ▶ **6DR4004-8L**
- Reduced mounting kit (like 6DR4004-8V but without fixing angle and U-bracket), with short lever with up to 35 mm travel (1.38 inch) ▶ **6DR4004-8VK**
- Reduced mounting kit (like 6DR4004-8V but without fixing angle and U-bracket), with long lever with > 35 mm travel (1.38 inch) ▶ **6DR4004-8VL**
- Roll and disk made of stainless steel 316 for replacement of the aluminum terminal blocks in the 6DR4004-8, -8VK and -8VL mounting kits for NAMUR linear actuators ▶ **6DR4004-3N**
- Two terminal blocks made of stainless steel 316 for replacement of the aluminum terminal blocks in the 6DR4004-8V, -8VK and -8VL mounting kits for NAMUR linear actuators ▶ **6DR4004-3M**

Mounting kit for other linear actuators

- Retrofitting kit for Moore series 72 and 750 valve positioners ▶ **TGX:16152-117**
- Masoneilan type 87/88 ▶ **TGX:16152-620**
- Fisher type 657/667, size 30 to 80 ▶ **TGX:16152-110**
- Samson actuator type 3277 (yoke dimension (H5) = 101 mm² (integrated connection without tube), not for Ex d) ▶ **6DR4004-8S**

OPOS Interface according to VDI/VDE 3847

- OPOS adapter with interface VDI/VDE 3847, blanketing, not for flameproof aluminum enclosure ▶ **6DR4004-5PA**
- OPOS/NAMUR mounting kit with short lever (complete), base plate, rail, mounting parts ▶ **6DR4004-5PL**

Connection block, for safety solenoid valve with extended mounting flange to NAMUR

- For mounting to IEC 534-6 ▶ **6DR4004-1B**
- For SAMSON actuator (integrated mounting) see above ▶ **6DR4004-1C¹⁾**

Documentation (see notes below)

Operating Instructions

- SIPART PS2 HART German ▶ **A5E00074630**
- SIPART PS2 HART English ▶ **A5E00074631**
- SIPART PS2 PROFIBUS PA German ▶ **A5E00127924**
- SIPART PS2 PROFIBUS PA English ▶ **A5E00127926**
- SIPART PS2 FOUNDATION Fieldbus German ▶ **A5E00214568**
- SIPART PS2 FOUNDATION Fieldbus English ▶ **A5E00214569**

SIPART PS2 Compact Instruction Manual

- English, French, German, Spanish, Italian, Dutch ▶ **A5E03436620**
- Estonian, Latvian, Lithuanian, Polish, Romanian ▶ **A5E03436655**
- Bulgarian, Czech, Finnish, Slovakian, Slovenian ▶ **A5E03436664**
- Danish, Greek, Portuguese, Swedish, Hungarian ▶ **A5E03436683**

Operating Instructions for NCS Sensor

- English, German, French, Italian, Spanish, Portuguese (Brazil) ▶ **A5E00097485**

SIPART PS2 device documentation

- DVD with complete documentation for all device versions ▶ **A5E00214567**

SITRANS I100 output isolator HART

(see "SITRANS I supply units and isolation amplifiers") with

- 24 V DC auxiliary power ▶ **7NG4124-0AA00**

SITRANS I200 output isolator HART

(see "SITRANS I supply units and isolation amplifiers") with

- 24 V DC auxiliary power ▶ **7NG4131-0AA00**

HART modem for connecting to PC or laptop

- with USB interface ▶ **7MF4997-1DB**

▶ Available ex stock

¹⁾ Only together with 6DR4004-8S and 6DR4004-1M.

Note:

All the above-mentioned manuals are included on DVD and can be downloaded from www.siemens.de/sipartps2.

Scope of delivery for positioner

- 1 SIPART PS2 positioner as ordered
- 1 DVD with the complete documentation for all versions and accessories
- Short manual "SIPART PS2 - Configuration At a Glance"

Selection and ordering data

Article No.

NCS-Sensor spare parts

Magnet holder made of fiberglass-reinforced polyester including magnet for non-contacting position detection for part-turn actuators

A5E00078030

Magnet holder made of anodized aluminum including magnet for non-contacting position detection for part-turn actuators

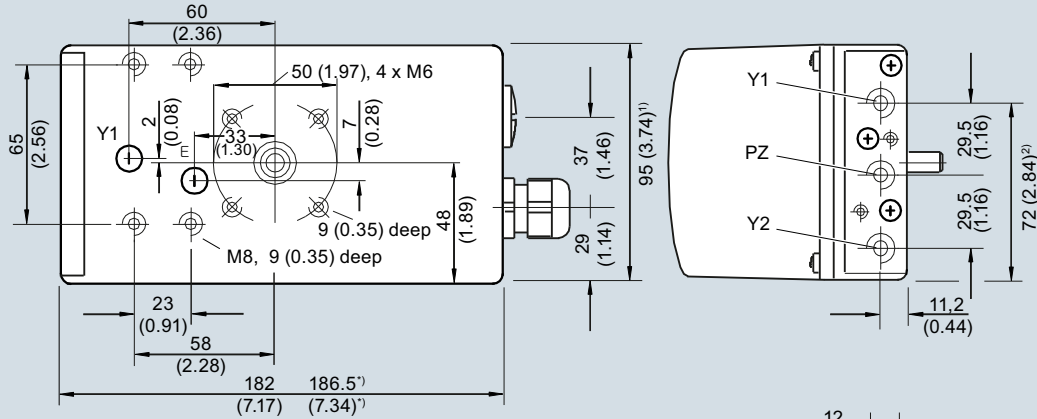
A5E00524070

Positioners SIPART PS2

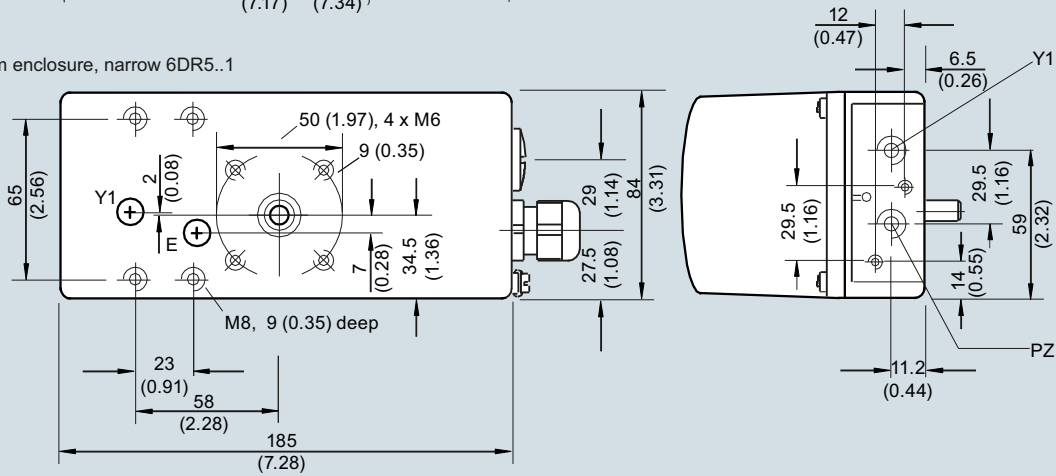
Dimensional drawings

Dimensional drawings

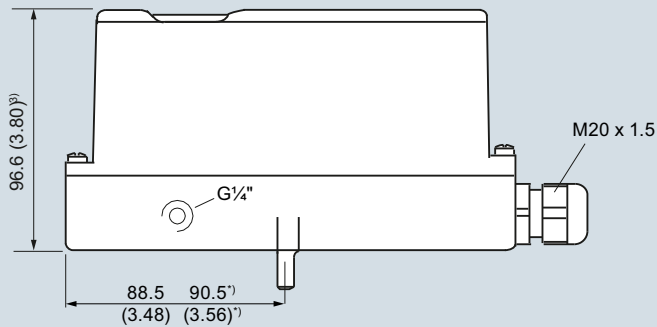
Makrolon enclosure 6DR5..0
Stainless steel enclosure 6DR5..2



Aluminum enclosure, narrow 6DR5..1



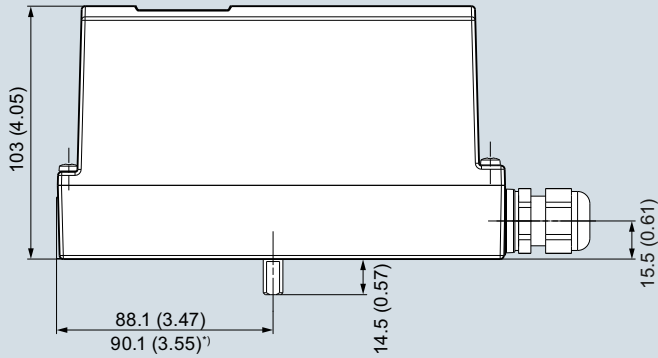
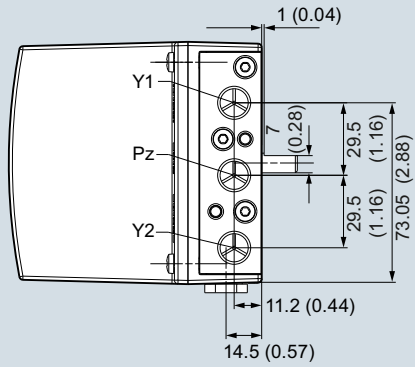
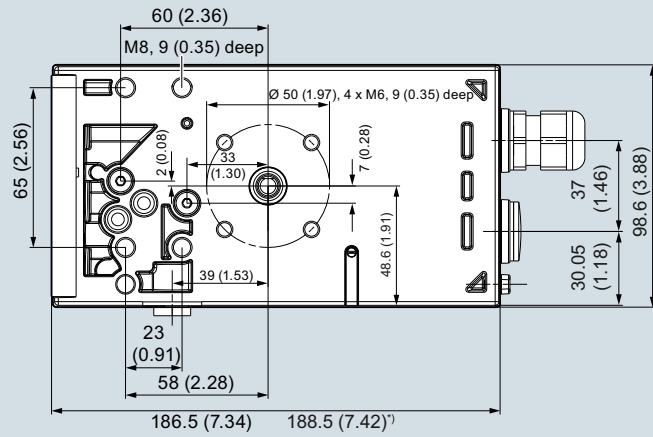
Makrolon enclosure 6DR5..0
Aluminum enclosure, narrow 6DR5..1
Stainless steel enclosure 6DR..2



¹⁾ Dimensions with pneumatic terminal block NPT
Stainless steel version, values:
¹⁾ 99 (3.89)
²⁾ 74 (2.91)
³⁾ 98 (3.86)

Dimensional drawings for enclosure, dimensions in mm (inch)

5

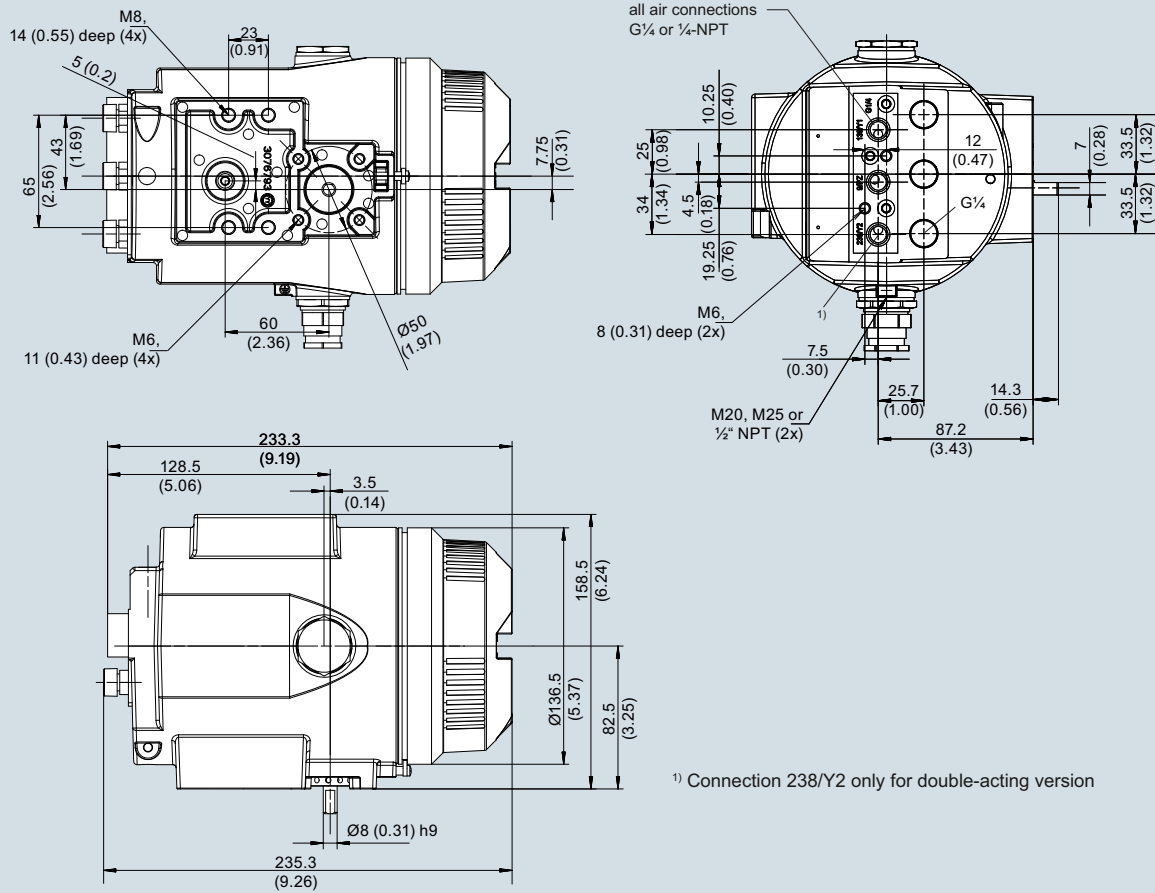


¹⁾ Dimensions with pneumatic terminal block NPT

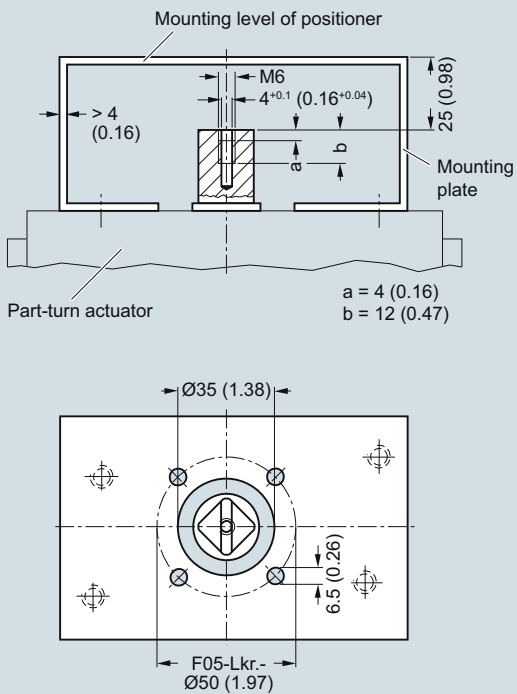
Aluminum enclosure 6DR5..3, dimensions in mm (inch)

Positioners SIPART PS2

Dimensional drawings



Flameproof aluminum enclosure 6DR5..5, dimensions in mm (inch)



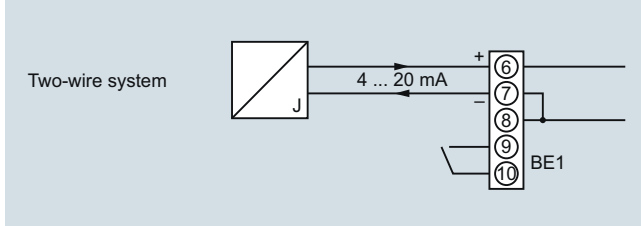
Mounting onto part-turn actuators; mounting consoles (scope of delivery of actuator manufacturer), extract from VDI/VDE 3845, dimensions in mm (inch)

5

Schematics

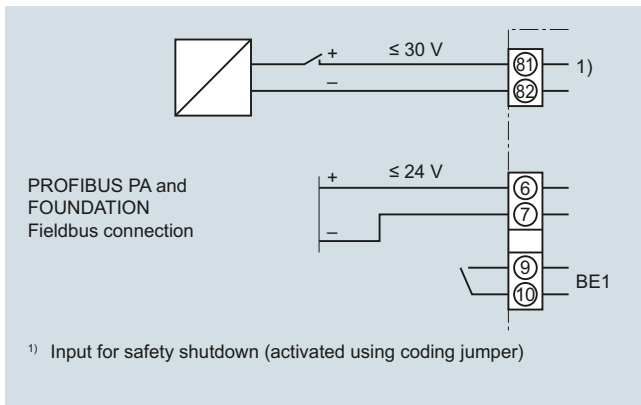
Electric connection of 2-wire devices (6DR50.. and 6DR51..)

Devices of types 6DR50.. and 6DR51.. are operated in a 2-wire system.



SIPART PS2 electropneumatic positioner, input circuit for 6DR50.. and 6DR51..

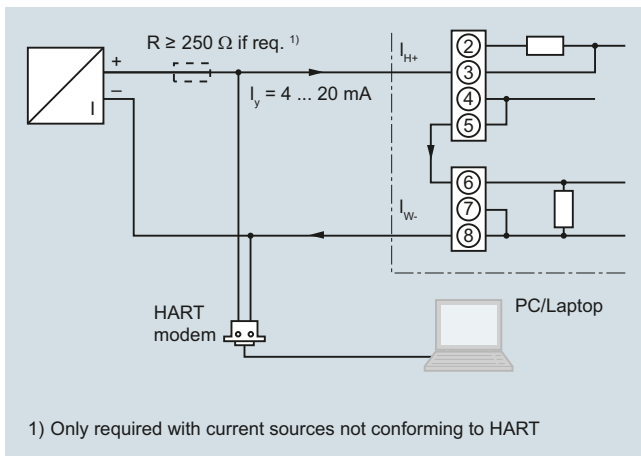
Electric connection of PROFIBUS PA device (6DR55..) and FOUNDATION Fieldbus device (6DR56..)



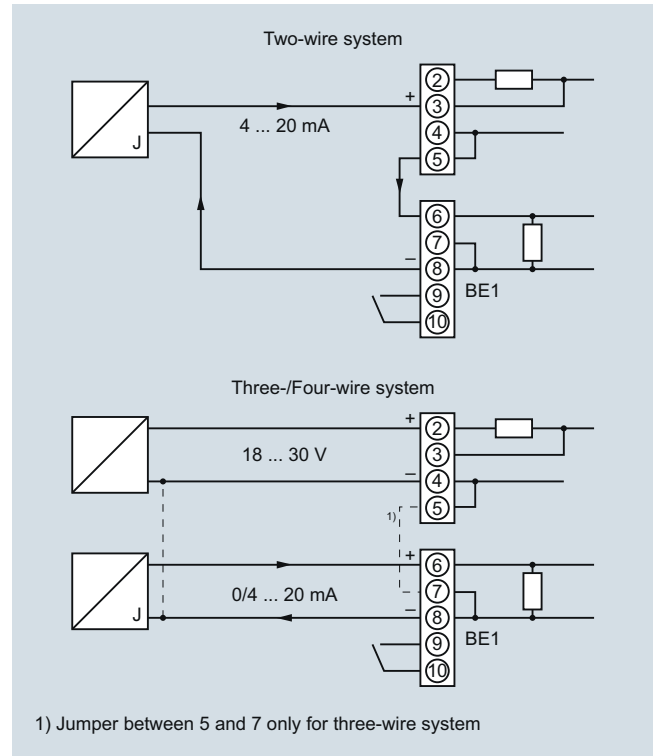
SIPART PS2 PA and SIPART PS2 FF electropneumatic positioner, input circuit for 6DR55.. and 6DR56..

Electric connection of 2-, 3- and 4-wire device (6DR52.. and 6DR53..)

Devices of types 6DR52.. and 6DR53.. can be operated in a 2-, 3- and 4-wire system.



SIPART PS2 electropneumatic positioner, example of connection for communication through HART for 6DR52..



SIPART PS2 electropneumatic positioner, input circuits for 6DR52.. and 6DR53..

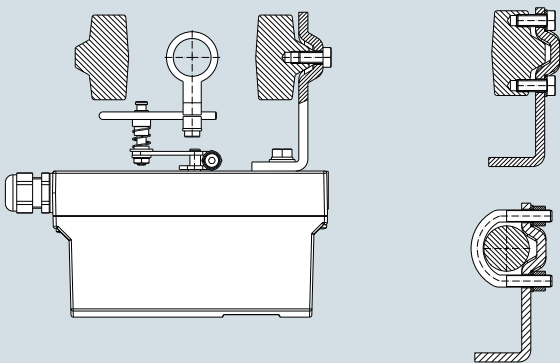
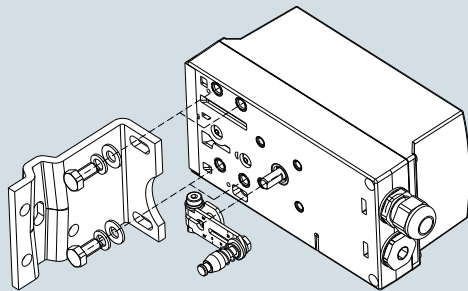
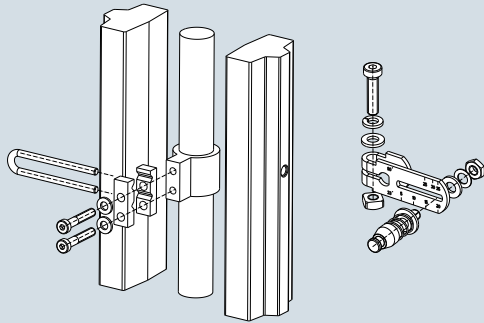
Positioners

SIPART PS2

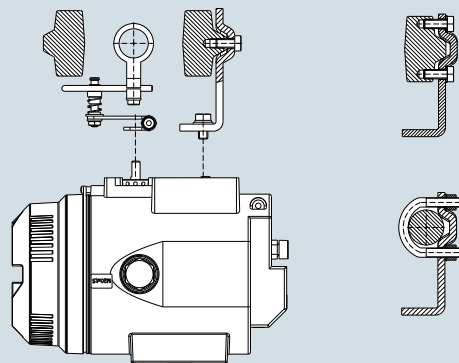
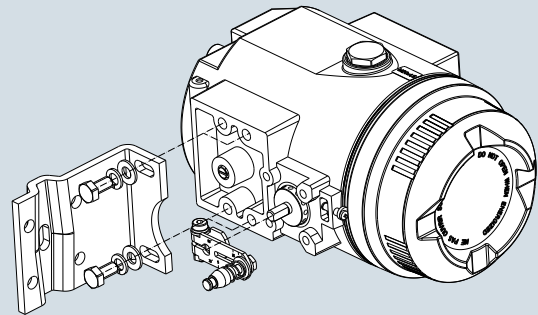
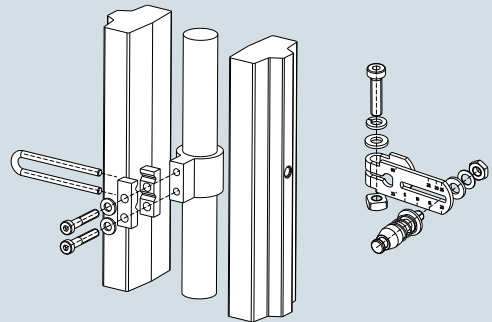
Mounting kit

Mounting kit for NAMUR linear actuators

- 1 mounting bracket
- 2 mounting prisms
- 1 U-bracket
- 1 lever arm with adjustable pick-up roll
- 2 U-bolts
- Various screws and lock washers



Mounting of SIPART PS2 on linear actuators

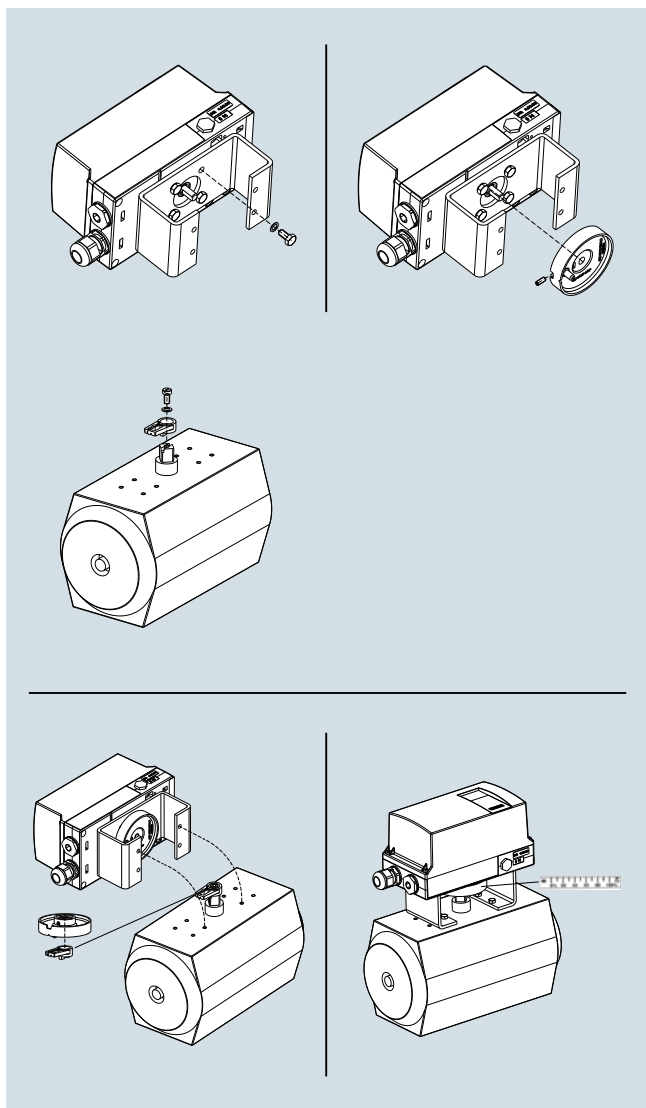


Mounting of SIPART PS2 in flameproof aluminum enclosure on linear actuators

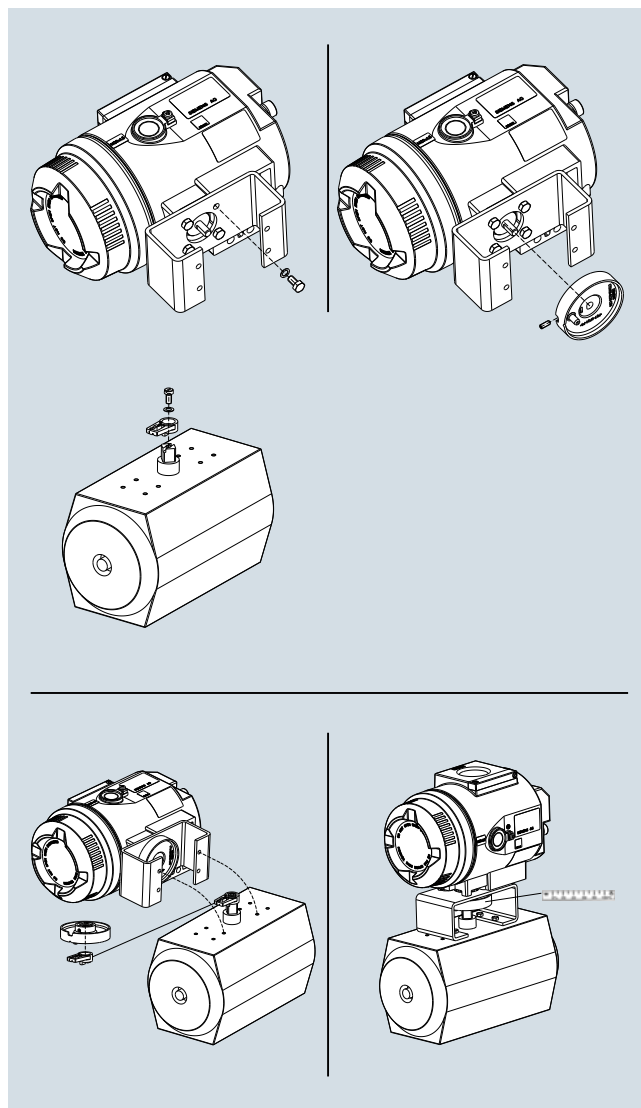
Mounting kit for NAMUR part-turn actuators

- 1 coupling wheel
- 1 driver pin
- 8 scales
- 1 pointer
- Various screws and lock washers

Caution: The mounting consoles and the screws for mounting onto the part-turn actuator are not included in the scope of delivery and must be provided by the customer (see "Technical specifications")



Mounting of SIPART PS2 on part-turn actuators



Mounting of SIPART PS2 in flameproof aluminum enclosure on part-turn actuators

More information**Special versions**

On request

Positioners

Notes

5

Process Protection



6/2	Overview
6/3	Acoustic and motion sensing
6/5	Acoustic sensors for pump monitoring SITRANS DA400 acoustic diagnostic unit
6/10 6/14	Acoustic sensors for material flow monitoring SITRANS AS100 acoustic sensor SITRANS CU02 control unit
6/17 6/23 6/25	Motion sensors Milltronics MFA 4p motion failure alarm controller Milltronics MSP-7 motion sensor SITRANS WM100 motion sensor

You can download all instructions, catalogs and certificates for Process Protection free of charge at:
www.siemens.com/processprotection

Process Protection

Overview

Overview

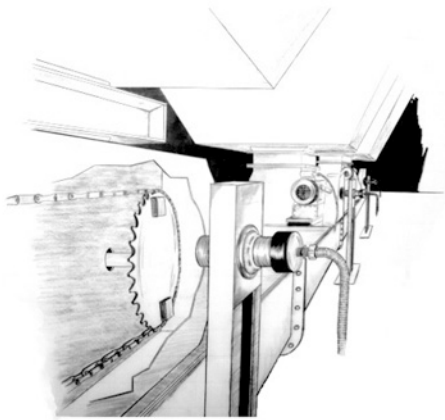
	Application	Device description	Page
Acoustic sensor for pump monitoring			
	Acoustic diagnostics unit for flow valve leakage monitoring in oscillating displacement pumps or for material flow monitoring of bulk solids in pipes, conveyors or raceways.	SITRANS DA400 <ul style="list-style-type: none"> • 4 inputs for structure-born noise sensors • 4 universal inputs • 6 digital outputs • With PROFIBUS DP or PROFIBUS PA • Sensor degree of protection IP66/IP68 	6/5
Acoustic sensors for material flow monitoring			
	Acoustic sensor for solids flow detection.	SITRANS AS100 <ul style="list-style-type: none"> • Non-invasive • Screw in, bolt on, weld, or bond in place • Analog output • High and low sensitivity range of operation 	6/10
	Alarm control unit for use with SITRANS AS100 acoustic sensor to provide reliable continuous protection for bulk solid flow. It processes signals from the sensor, providing relay and analog outputs for interface into a process.	SITRANS CU02 <ul style="list-style-type: none"> • 3 digit LCD display • 4 ... 20 mA output • Two programmable relays • Adjustable independent time delay for each relay • DIN rail mounting provides easy installation 	6/14
Motion sensors			
	Highly sensitive single set point motion sensor alarm unit, used with MSP probes.	Milltronics MFA 4p <ul style="list-style-type: none"> • Probe/target separation up to 100 mm (4 inch) • Minimum velocity of moving ferrous target: 1 cm/sec. (2 fpm) 	6/17
	Heavy duty 3-wire motion sensor that provides an NPN open collector output to PLCs.	Milltronics MSP-7 <ul style="list-style-type: none"> • Up to 100 mm (4 inch) gap between target and probe • Corrosion resistant construction 	6/23
	Heavy-duty zero speed alarm switch.	SITRANS WM100 <ul style="list-style-type: none"> • Detects the absence or presence of motion of rotating or reciprocating or conveying equipment 	6/25

Overview

Process protection devices act as early warning systems to avoid costly process interruptions and breakdowns of equipment. Non-contacting motion sensors detect changes in motion and speed of conveying, reciprocating and rotating machinery.

Non-invasive acoustic sensors detect inaudible, high frequency acoustic emissions generated by friction and impact, caused by materials in motion. They can detect conditions of flow/no flow or high/low flow, to warn of blockages, product absence or equipment failure. They are located outside of the process, accurately detecting conditions without wear on the sensor.

Motion sensors can warn in case of equipment malfunction and shut down machinery in case of a slowdown or failure. They are rugged and perform even in harsh industrial conditions. Most of the MFA 4p motion sensing probes, as well as the SITRANS WM100, can be mounted up to 100 mm (4 inch) from the ferrous target, reducing the chance of damage to the probe and the equipment. The probes are not affected by moisture or dust build-up.



Motion sensing on drive shaft of rotary feeder

Mode of operation

Acoustic Sensing

Acoustic sensors monitor high frequency emissions generated by friction and the impact of flowing material or mechanical parts. The sensors can also sense the turbulence of gases or liquids leaking through valves and flanges. When matter vibrates between 0 Hz and 200 kHz, it creates acoustic energy. Sound energy between 20 Hz and 20 kHz can be detected by humans. Acoustic sensors detect high-frequency acoustic energy between 75 kHz and 175 kHz. Acoustic energy travels quickly through dense materials (metal) and poorly through less dense materials (air). Because the acoustic sensors are mounted directly to the external wall of the chute work, other plant noises are well below 75 kHz and effectively ignored by the sensors.

The acoustic sensors contain a specialized piezocrystal and filter circuit that responds effectively to the high-frequency band between 75 kHz and 175 kHz. As the crystal is excited by the acoustic energy, it produces a continuous electrical signal in direct proportion to the level of acoustic energy received. The SITRANS AS100 sensor output of 0 to 10 V DC can be applied to a PLC or to an optional control unit for a programmable alarm relay or 4 to 20 mA signal output.

Motion sensing

Siemens Milltronics probes work on the principle of Faraday's Laws of Electromagnetic Induction. When a ferromagnetic object enters the probe's permanent magnetic field, it distorts the flux, causing its coil windings to generate a voltage. This voltage is proportional to the strength of the magnet and the number of wire turns in the coil (constant in the probes) and the speed at which the ferrous target passes through the flux. The generated voltage is also inversely proportional to the square of the distance between the target and the probe.

The robust motion sensors provide the contacts to shut down machinery whenever under-speed, over-speed or plant equipment failure occurs. On belt, drag and screw conveyors, or on bucket elevators, fans and pumps, the speed alarm option can warn instantly of equipment malfunction. Some probes may be linked to a programmable logic controller to monitor equipment.

Process Protection

Acoustic and Motion sensing

Acoustic and Motion Sensing

Technical specifications

Process Protection Selection Guide

Criteria	SITRANS DA400	SITRANS AS100	Milltronics MFA 4p	MSP-7	SITRANS WM100
Typical industries	Mining, water/wastewater, chemicals/petrochemicals and oil & gas industry	Aggregates, grain, cement, food processing, power generation, steel processing	Aggregates, cement, mining, wastewater, grain	General Industrial applications	Aggregates, cement, mining
Typical Applications	Oscillating displacement pumps such as diaphragm piston pumps, piston pumps and hose-type diaphragm piston pumps. Monitoring of flowing materials in pipes, conveyors or channels.	Pipes, pneumatic conveyors, aerated gravity flow systems, burst filter bag detection	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators	Tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators
Operation	Acoustic detection of cavitation, optionally acoustic detection of impact noises of high frequency	Acoustic sensing	Motion sensing	Motion sensing	Motion sensing
Enclosure	Electronics housing, Makrolon IP65, sensor, stainless steel material number W-No. 1.4571 (316Ti SST)	Compact 304 or 303 stainless steel, IP68	Type 4X/NEMA 4X/IP65 polycarbonate	Type 4X/NEMA 4X/IP67 aluminum	Type 4X/NEMA 4X/IP67 aluminum
Sensor mounting	Screw to outside of pump housing. For material flow monitoring on the outside of pipes, channels, chutes or raceways	Sensor non-invasive: glue or weld-on disc, bolt or weld-on tab, drill and tap	Non-contacting probes secured with supplied flange	Non-contacting probe, secured with supplied flange	Non-contacting, secured with supplied flange
Operating temperature	Electronics -20 °C ... +60 °C (-4 °F ... +140 °F) Sensor -20 °C ... +110 °C (-4 °F ... +230 °F)	-20 ... +80 °C (-4 ... +176 °F) ¹⁾	-20 ... +50 °C (-4 ... +122 °F) ²⁾	-40 ... +60 °C (-40 ... +140 °F)	-40 ... +60 °C (-40 ... +140 °F)
Power requirements	19 V ... 36 V DC, < 100 mA	20 ... 30 V DC, 18 mA	100/115/200/230 V AC ± 10 % 50/60Hz, 15 VA	21 or 28 V DC, 40 mA max.	115 or 230 V AC ± 10 % 50/60 Hz, 7 VA
Approvals	CE, PROFIBUS DP and PROFIBUS PA conform, Ex protection to ATEX 1G or 1D	CE, RCM, CSA/FM Class II, Div. 1, Group E, F, G optional, ATEX II, 2GD, 3D optional, GOST-R	CSA _{US/C} , CE, RCM	CE, RCM	CSA _{US/C} , CE, RCM

¹⁾ Extended temperature model -40 ... +125 °C (-40 ... +257 °F) available (CE version)

²⁾ Probes available for -40 ... +260 °C (-40 ... +500 °F)

Overview



The SITRANS DA400 acoustic diagnostic unit acoustically measures the structure-borne noise

- In the version for pump monitoring; on oscillating displacement pumps
- In the version for material flow monitoring; on pipes, conveying equipment or channels.

It comprises an electric diagnostic unit and up to four acoustic sensors.

Benefits

Benefits when pump monitoring

- Increased availability of the system through:
 - Advanced maintenance planning thanks to early recognition of defective components
 - Reduced downtimes (no fault locating necessary)
 - Increased maintenance intervals
 - Greater pump reliability
- Prevention of expensive consequential damage
- Increased safety of critical applications
- Early recognition of a reduction in power
- Increased productivity

Benefits when material flow monitoring

- Detection of insufficient or excessive inflow of material in a liquid or gas flow
- Detection of blockages or clogging
- Reduction of down times
- Increased product quality
- Increased availability
- Guaranteed operational safety
- Increased productivity

Application

In the version for pump monitoring, the SITRANS DA400 allows continuous, simultaneous and independent monitoring of up to four flow control valves in a pump for leaks. In addition, another four inputs are available for monitoring standard signals (e.g. diaphragm and temperature monitoring). This means that the condition of an oscillating displacement pump is monitored in every phase of its operation.

The SITRANS DA400 is used in all industries where an oscillating displacement pump is used.

The version for material flow monitoring monitors the material flow in liquids or gases that is usually as a result of impact or friction, e.g. against the pipe or channel wall.

If the acoustic diagnostic unit is used in potentially explosive areas, the sensors as well as the acoustic diagnostic unit can be installed in the Ex-zone.

If using the unit in potentially explosive areas, you have two options:

- Operation of the sensors over the safety barriers or
- Operation of the sensors over the SITRANS DA400 with explosion protection

Function

Product features

Continuous and independent status monitoring:

- Of the flow control valves, for leaks
- Of the membranes, for material fatigue
- Of the temperature loading of the hydraulic oil
- Of flowing bulk solids in pipes, conveying equipment or channels

Communication of the status to superordinate control systems:

- Via digital outputs
- Digitally, via PROFIBUS DP or PROFIBUS PA

Simple to operate and parameterize:

- Locally, via digital display and keys
- PROFIBUS DP and PROFIBUS PA

Mode of operation

Principle of measurement

Leaks in the flow control valves of oscillating displacement pumps are flows in which cavitation occurs. This results in sound waves that are transmitted to the valve housing, where they are recorded by the structure-borne sound sensor in the SITRANS DA400 on the outside.

The SITRANS DA400 utilizes the fact that with both an open valve and a closed intact valve, no cavitation occurs and the measured sound level thus corresponds to the operating noise of the pump. By contrast, with a closed defective valve cavitation does occur, which can be identified by a period increase in the sound level (see figures). The measured value from the SITRANS DA400 corresponds exactly to this increase in the sound level.

In the version for material flow monitoring, SITRANS DA400 continuously detects high-frequency acoustic oscillations by means of structure-born noise sensors.

Process Protection

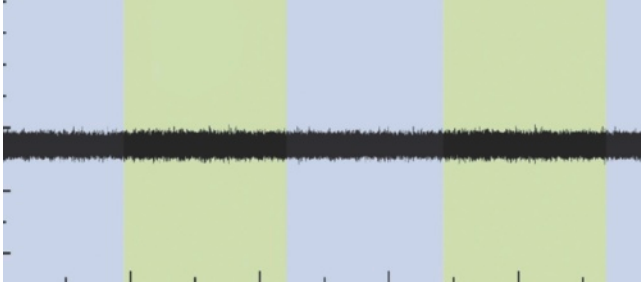
Acoustic sensors for pump monitoring

SITRANS DA400 acoustic diagnostic unit

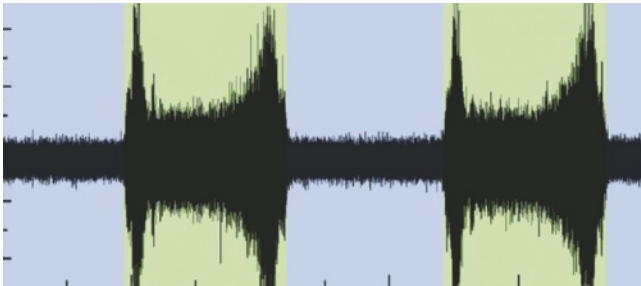
These oscillations are created by:

- Friction and impact of bulk solids in:
 - pipes, raceways or channels
 - chutes
 - conveyors
- Friction and impact of mechanical parts
- Bursting of bubbles
- Cavitation
- Turbulence in gas and liquid flows

The following shows an example of signal levels at an oscillating displacement pump



Signal from structure-borne sound sensor with intact valve



Signal from structure-borne sound sensor with defective valve

Sensor operation

The structure-borne sound sensor works on the piezoelectric principle. The structure-borne sound is injected into the sensor via the sensor base (mounting surface) and inside it is converted into an electrical voltage by a piezo-ceramic element. This is amplified in the sensor and transmitted via the cable.

The sensor frequency range lies in the ultrasonic range (> 20 kHz). The sensor is non-directional, i.e. the angle at which the sound wave impacts on the sensor base is not important.

Mode of operation of the safety barrier

The safety barrier comprises intrinsically-safe circuits. These circuits serve to operate intrinsically-safe components such as sensors and to isolate safety from the non-hazardous area with the SITRANS DA400 diagnostic unit.

Technical specifications

SITRANS DA400	Without Ex protection	With Ex protection
Input		
Acoustic channels		4
• Cycle time		10 ms
Only for connection to intrinsically safe sensors with:		
• Max. voltage U_o	-	≤ 5.5 V
• Max. current I_o	-	≤ 70 mA
• Max. power P_o	-	≤ 100 mW
• Internal capacitance C_i	-	≤ 1.2 μ F
• Internal inductance L_i	-	Negligible
Universal inputs		4
• Cycle time		80 ms
• Low pass filter time		1 s
Universal analog current input		
• Load	< 105 Ω	< 12 Ω
• Resolution		0.1 %
• Accuracy		0.5 %
• Fault signal		> 21 mA or < 3.6 mA (at 4 ... 20 mA)
• Alarm monitoring hysteresis		0.5 %
• Static destruction limit	40 mA, 4 V	-
For connection with approved intrinsically safe circuits with:		
• Max. supply voltage U_i	-	≤ 30 V
• Max. short-circuit current I_i	-	≤ 100 mA
• Max. power P_{oi}	-	≤ 1 W
• Internal capacitance C_i	-	≤ 11 nF
• Internal inductance L_i	-	≤ 70 μ H
Universal input 24 V digital signal		
• Input resistance		> 19 k Ω
• Signal level Low		< 4.5 V or open
• Signal level High		> 7 V
• Hysteresis		> 1 V
• Static destruction limit	± 40 V	-
For connection with approved intrinsically safe circuits with:		
• Max. supply voltage U_i	-	≤ 30 V
• Max. short-circuit current I_i	-	≤ 100 mA
• Max. power P_{oi}	-	≤ 1 W
• Internal capacitance C_i	-	≤ 11 nF
• Internal inductance L_i	-	≤ 70 μ H

Process Protection

Acoustic sensors for pump monitoring

SITRANS DA400 acoustic diagnostic unit

SITRANS DA400	Without Ex protection	With Ex protection	SITRANS DA400	Without Ex protection	With Ex protection
Universal input closing contact For connection to closing contact with the maximum values: <ul style="list-style-type: none"> Max. voltage U_o Max. current I_o Max. power P_o Internal capacitance C_i Internal inductance L_i 8.2 V source for NAMUR signal (DIN EN 60947-5-6) <ul style="list-style-type: none"> Open circuit voltage Input resistance Static destruction limit for incorrect wiring 	-	≤ 10 V ≤ 1 mA ≤ 5 mW ≤ 11 nF ≤ 70 μ H	Electromagnetic Compatibility <ul style="list-style-type: none"> Emitted interference and interference immunity Usage limits for water <ul style="list-style-type: none"> Delivery side Number of strokes 	To EN 61326 and NAMUR NE 21	≥ 10 bar a Min. 4 min ⁻¹ , max. 10 ... 500 min ⁻¹
Output Digital outputs <ul style="list-style-type: none"> Semiconductor relay Switching voltage Destruction limit Max. switching current Signal status Low (no response) Signal status High (response) For connection with an intrinsically safe switching amplifier to DIN 19234 with: <ul style="list-style-type: none"> Max. supply voltage U_i Max. short-circuit current I_i Max. power P_{oi} Internal capacitance C_i Internal inductance L_i 	6	6 (applicable for NAMUR switch hardener) <ul style="list-style-type: none"> Individually isolated, short circuit-proof 24 V AC/36 V DC, any polarity 35 V AC, 50 V DC 100 mA ≤ 1.2 mA (source to DIN 19234) ≥ 2.1 mA (source to DIN 19234) ≤ 15.5 V ≤ 25 mA ≤ 64 mW ≤ 5.2 nF Negligible 	Design Weight (without options) Dimensions (W x H x D) in mm (inch) Enclosure material	Approx. 2.5 kg 172 x 320 x 80 (6.8 x 12.6 x 3.2)	Macrodon (polycarbonate +20 % glass fiber) Makrolon (Polycarbonate + 20 % glass fibers), surface attenuated with CrNi layer and painted
Conditions of use Installation conditions Climatic class Mounting location Permissible ambient temperature <ul style="list-style-type: none"> Temperature class T5 – T1 Temperature class T6 Mechanical load Degree of protection to EN 60529	Vertical wall mounting, cables fed in from below Class 4K4 according to EN 60721-3-4 - -20 ... +60 °C (-4 ... +140 °F)	- - - - ≤ 1.2 mA (source to DIN 19234) ≥ 2.1 mA (source to DIN 19234) ≤ 15.5 V ≤ 25 mA ≤ 64 mW ≤ 5.2 nF Negligible	Power supply Rated voltage Operating range Current consumption For connection with approved intrinsically safe circuits with: <ul style="list-style-type: none"> Max. supply voltage U_i Max. short-circuit current I_i Max. power P_{oi} Internal capacitance C_i Internal inductance L_i 	24 V DC 19 ... 36 V DC < 100 mA	16 V DC 15 ... 17 V DC < 40 mA
			Certificates and approvals Explosion protection to EN 50014, EN 50020 and EN 50021 Intrinsic safety "i"		TÜV (German Technical Inspectorate) 06 ATEX 2952
			Marking		II 2(1) G EEx is [ia] IIC T6
			Communication PROFIBUS DP Protocol Power supply Bus voltage Current consumption	RS 485, switchable terminating resistor Cyclic with Master C1 and acyclic with Master C2 - - -	- - Bus-supplied 9 ... 24 V 10.5 mA \pm 10 %

Process Protection

Acoustic sensors for pump monitoring

SITRANS DA400 acoustic diagnostic unit

SITRANS DA400	Without Ex protection	With Ex protection
Bus connection with FISCO supply unit, ia/ib group IIC or IIB	-	Yes
Layer 1 and 2 from PROFIBUS PA, transfer technology from IEC 1158-2	-	-
• C2 connections	-	4 connections are supported in master class 2
• Device profile	-	PROFIBUS PA profile V3.0 Rev. 1, Class B
• Device address	-	1 ... 126 (126 factory-set)
PC parameterization software	SIMATIC PDM (not included in the scope of delivery)	

Sensor for SITRANS DA400

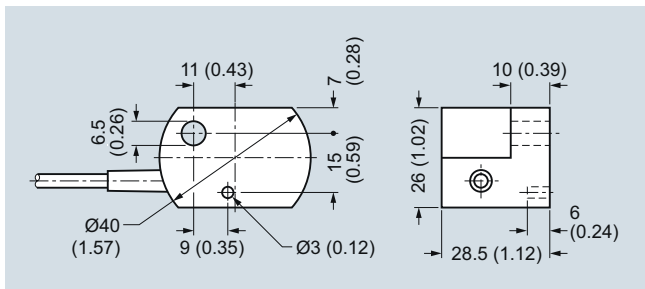
Setup	<ul style="list-style-type: none"> • Piezoceramic sensor with pre-amplifier • Encapsulated electronics • 4-wire cable with anti-kink sleeve
Conditions of use	
Permissible ambient temperature	-40 ... +110 °C (-40 ... +230 °F)
Degree of protection to EN 60529	IP66/IP68
Mechanical load	Class 4M7 according to EN 60721-3-4
Climatic class	Class 4K4 according to EN 60721-3-4
Design	
Housing material	Stainless steel 1.4571 (316Ti SST)
Cable	Ends with wire protectors and cable shoe for connection to the SITRANS DA400
Weight	125 g (0.276 lb)
Mounting location	Zone 0/1 or zone 20/21/22
Dimensions (W x H x D) in mm (inch)	26 x 29 x 40 (1.02 x 1.14 x 1.57)
Power supply	Power fed from device
Certificates and approvals	
Explosion protection	
Intrinsic safety "i"	TÜV 2005 ATEX 2876 X
Marking	II 1 G EEx ia IIC T6/T5/T4 or II 1 D EEx ia D 20/21/22 T160
Permissible ambient temperature	
• Category 1G	
- Temperature class T4, T5	-20 ... +60 °C (-4 ... +140 °F)
- Temperature class T6	-20 ... +50 °C (-4 ... +122 °F)
• Category 2G	
- Temperature class T4	-40 ... +110 °C (-40 ... +230 °F)
- Temperature class T5	-40 ... +80 °C (-40 ... +176 °F)
- Temperature class T6	-20 ... +65 °C (-4 ... +149 °F)
• Category 1D or 2D	
- Temperature class T160	-40 ... +110 °C (-40 ... +230 °F)

Ex barriers for sensors	
Application area	For the intrinsically safe supply of the acoustic sensors in zone 1; the safety barriers must be installed between the SITRANS DA400 acoustic diagnostic unit and the sensor if only the sensors are being operated in the Ex zone.
Input	A maximum of two sensors can be connected.
Conditions of use	
Degree of protection to EN 60529	IP20
Permissible Ambient Temperature	-20 ... +60 °C (-4 ... +140 °F)
Design	
Weight	115 g (0.254 lb)
Housing material	Plastic, polyamide
Type of installation	Installation on mounting rail NS 32 or NS 35/7.5. The acoustic diagnostic unit SITRANS DA400 and the safety barrier must be operated outside the Ex zone.
Dimensions (W x H x D) in mm (inch)	68 x 77 x 42 (2.68 x 3.03 x 1.65)
Certificates and Approvals	
Explosion protection	
Intrinsic safety "i"	TÜV 05 ATEX 2917 X
Marking	II (2) G [EEx ib] IIC

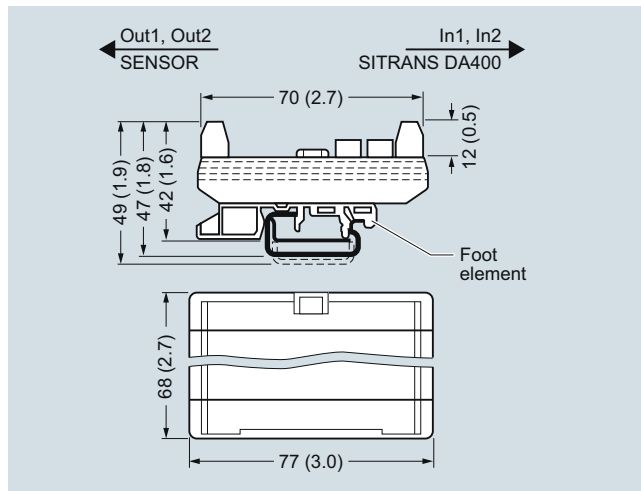
Selection and Ordering data	Article No.
Acoustic diagnostics unit SITRANS DA400 with local programming and display	7MJ2400- A0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Communication	
• PROFIBUS DP	1 A
• PROFIBUS PA	2 B
Explosion protection	
• Without	A
• With EEx ia/ib to ATEX ¹⁾	B
Application software	
For continuous condition monitoring of positive displacement pumps	1
for material flow monitoring in pipes, raceways and conveyors	2
Acoustic sensors for diagnostics unit SITRANS DA400	7MJ2000-1 00
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Explosion protection	
• Without	A
• With EEx ia to ATEX	B
Cable (incl. pin and allen screw M6)	
20 m	B
40 m	C
100 m	F
Safety barriers for sensors	7MJ2010-1AA
For rail mounting NS 32 and NS35/7.5 in non-hazardous areas Explosion-protected output circuit EEx ib	

¹⁾ Not in combination with trigger sensor.

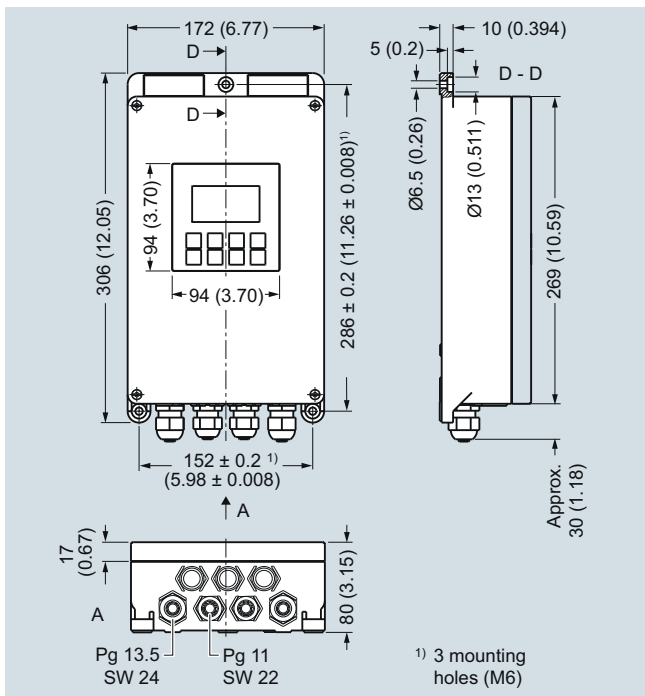
Dimensional drawings



Sensor for SITRANS DA400, dimensions in mm (inch)

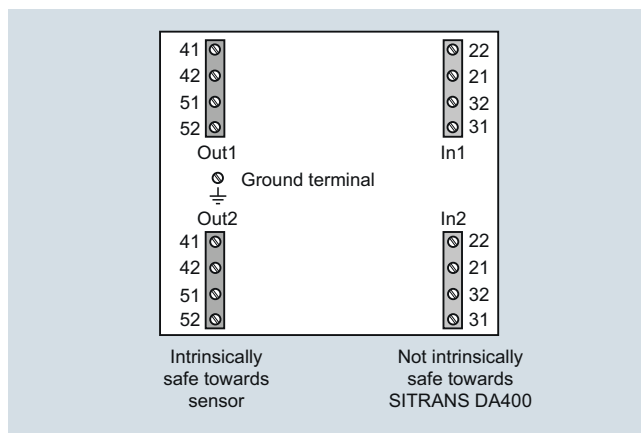


Safety barrier for SITRANS DA400, dimensions in mm (inch)

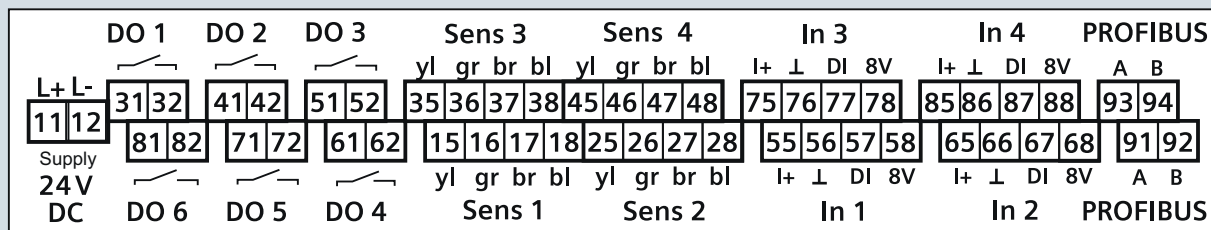


SITRANS DA400, dimensions in mm (inch)

Schematics



Safety barrier for SITRANS DA400, terminal assignment



- L+/L- Power supply (Any polarity with PROFIBUS PA)
- DO Digital output
- Sens Sensor
- In Input
- yl yellow
- gr green
- br brown
- bl black
- I+ Analog current input +
- ⊥ Ground
- DI Digital input
- A Signal A (green) with PROFIBUS DP, any with PROFIBUS PA
- B Signal B (red) with PROFIBUS DP, any with PROFIBUS PA

SITRANS DA400, terminal assignment

Process Protection

Acoustic sensors for material flow monitoring

SITRANS AS100 acoustic sensor

Overview



SITRANS AS100 is an acoustic sensor used for solids flow detection.

Benefits

- Non-invasive
- Screw in, bolt on, weld, or bond in place
- Analog output
- High and low sensitivity range of operation

Application

SITRANS AS100 detects changes in high frequency sound waves from equipment and materials in motion. It detects and reacts instantly to changes in solids flow to warn of blockages, product absence, or equipment failure such as burst filter bags. This allows an operator to take early preventative action and avoid costly damage.

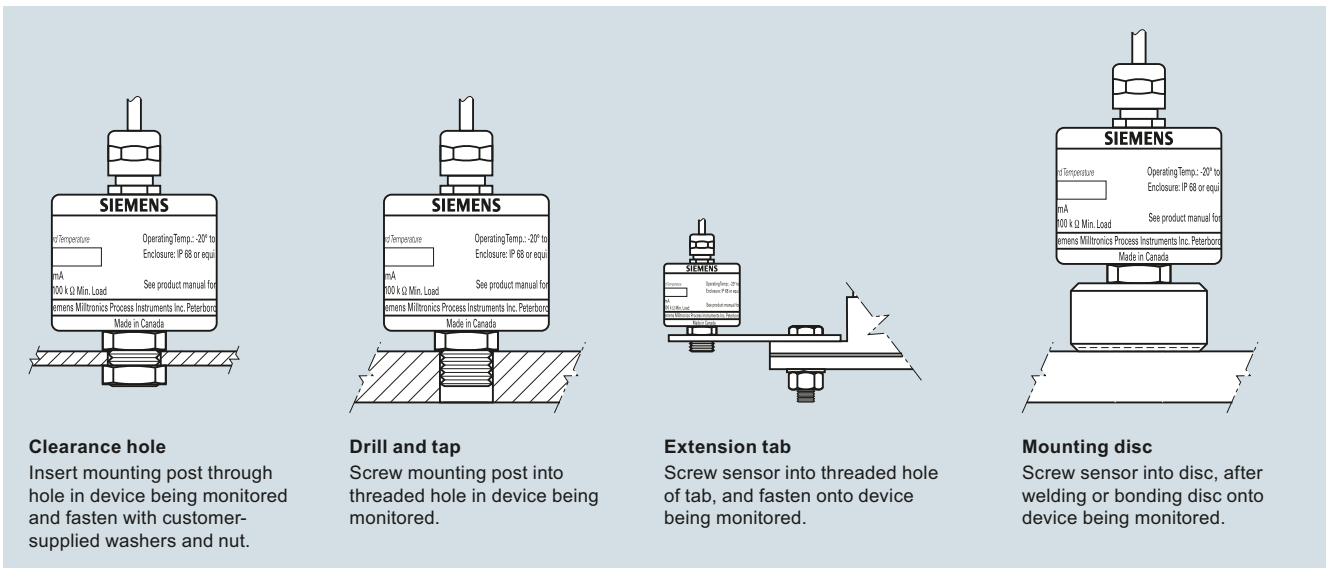
Common applications include pellets, powders and most bulk solids in pipes, chutes, vibratory feeders, pneumatic conveyors or aerated gravity flow systems.

Operating with a SITRANS CU02 control unit, the system detects conditions of high flow, low flow or no flow. It can be added to a control loop via a 4 to 20 mA output. Two relays are fully programmable and independent of each other and can be used to operate an alarm or control device.

With no moving parts and a type 304 or 303 stainless steel enclosure sealed against dust and moisture, this non-invasive unit requires little or no maintenance. With a dual operating range, the sensor offers an exceptionally wide range of application capabilities.

- Key applications: pipes, chutes, vibratory feeders, aerated gravity flow systems, burst filter bag detection

Design



SITRANS AS100 mounting

Process Protection

Acoustic sensors for material flow monitoring

SITRANS AS100 acoustic sensor

Technical specifications		Selection and Ordering data		Article No.
Mode of operation		SITRANS AS100 Acoustic Sensor		7MH7560-
Operating principle	Acoustic sensing of high frequency emissions caused by impact or friction	An acoustic sensor used for solids flow detection.		0
Typical application	<ul style="list-style-type: none"> • Detects burst filter bags in dust collection systems • Detects material being conveyed in pneumatic conveyor lines • Route confirmation in chute work 	Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Model		Sensor		
Standard	Standard operating temperature range	Standard temperature range [-20 ... +80 °C (-4 ... +176 °F)] ¹⁾	1	
Extended	Extended operating temperature range	Extended temperature range [-40 ... +125 °C (-40 ... +257 °F)] ²⁾	3	
		Extended temperature range [-30 ... +120 °C (-22 ... +248 °F)] ³⁾	4	
Operation		Cable Length		
Relative sensitivity	0.5 %/°C of reading, average over the operating range	4 m (13.12 ft)	A	
Outputs	Analog, 0.08 ... 10 V DC nominal, 100 kΩ minimum load impedance	Sensor Mounting		
		None	A	
		Mounting disk	B	
		Mounting tab	C	
Rated operating conditions		Approvals		
Amb. temperature for enclosure		CE, RCM	1	
• Standard	-20 ... +80 °C (-4 ... +176 °F)	CSA/FM Class II Div.1, Group E, F, and G (includes ½" NPT female fitting)	3	
• Extended	<ul style="list-style-type: none"> • -40 ... +125 °C (-40 ... +257 °F) (CE only) • -30 ... +120 °C (-22 ... +248 °F) option 	CSA Class II, Div. 1, Group E, F, and G (includes ½" NPT female fitting)	4	
		CE, RCM, FM/CSA Class II, Div. 1, Group E, F and G, ATEX II 3D (includes M20 female fitting)	5	
		ATEX II 2GD, c/w cable gland ⁴⁾	6	
Design				
Weight	0.4 kg (1 lb)			
Enclosure	Enclosure: 304 (1.4301) stainless steel [303 stainless steel (1.4305) on Class II version], aluminum 231 on 2GD version]			
Degree of protection	IP68 (waterproof)			
Cable				
• Standard	4 m (13 ft) cable, PVC jacketed, 3 twisted pairs, 24 AWG (0.25 mm ²), shielded			
• Extended	4 m (13 ft) cable, thermoplastic elastomer jacketed, 6 conductor, 24 AWG (0.25 mm ²) conductor, shielded			
Power supply				
	20 ... 30 V DC, 18 mA (typical)			
Certificates and approvals				
	CE, RCM CSA/FM Class II, Div. 1, Group E, F and G (optional), ATEX II 2GD (optional), ATEX II 3D (optional), GOST-R			
		Selection and Ordering data		Order code
		Further designs		
		Please add " -Z " to Article No. and specify Order code(s).		
		Manufacturer's test certificate: According to EN 10204-2.2	C11	
		Acrylic coated, stainless steel tag [12 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	Y17	
		Operating Instructions		Article No.
		English	A5E31952194	
		German	A5E31990912	
		French	A5E31993317	
		Spanish	7ML1998-5DM21	
		Note: The operating instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing ATEX Quick Starts and operating instructions.		
		Spare Parts		
		Mounting tab	7MH7723-1AA	
		Mounting disk	7MH7723-1AB	
		½" NPT adapter kit for standard temperature range sensor, not Class II approved	7MH7723-1BW	
		M20 adapter kit for standard temperature range sensor, not Class II or ATEX approved	7MH7723-1BV	
		½" NPT adapter kit for extended temperature range sensor, not Class II approved Note: Adapter kits are not CSA Class II approved	7MH7723-1BX	

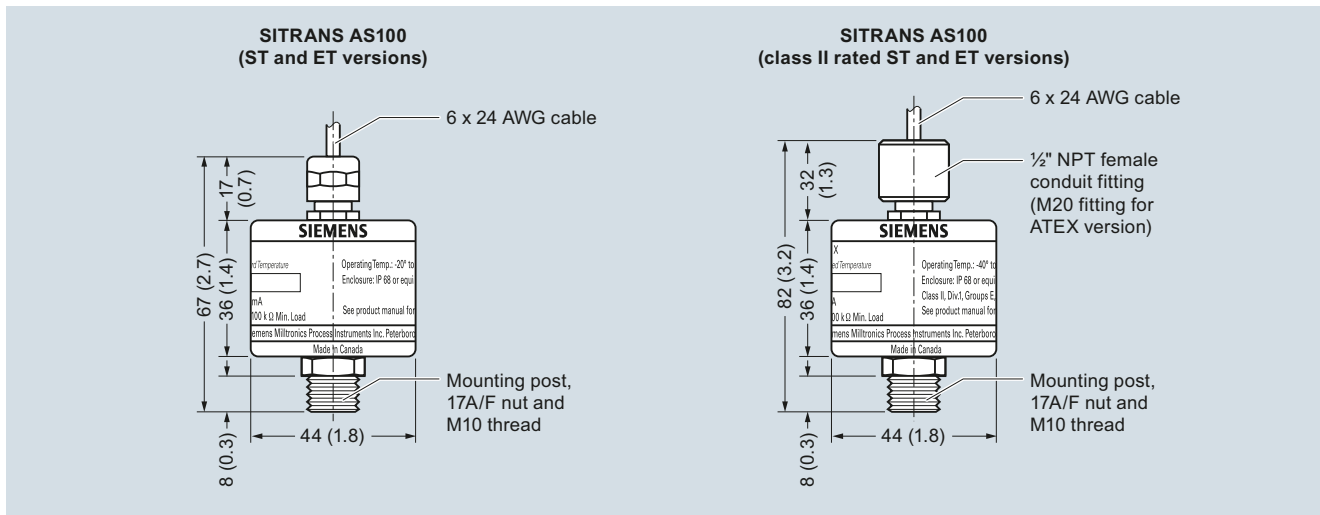
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Process Protection

Acoustic sensors for material flow monitoring

SITRANS AS100 acoustic sensor

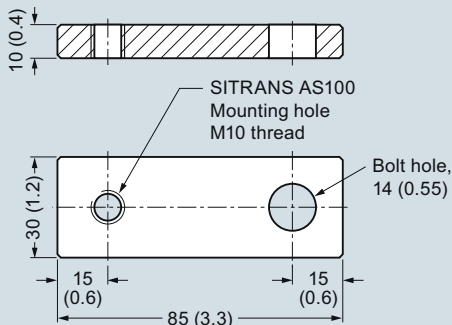
Dimensional drawings



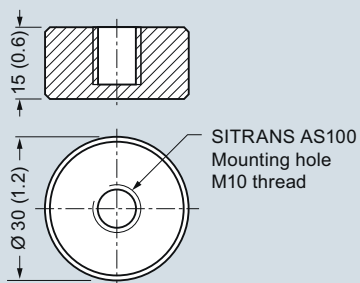
SITRANS AS100, dimensions in mm (inch)

Accessories

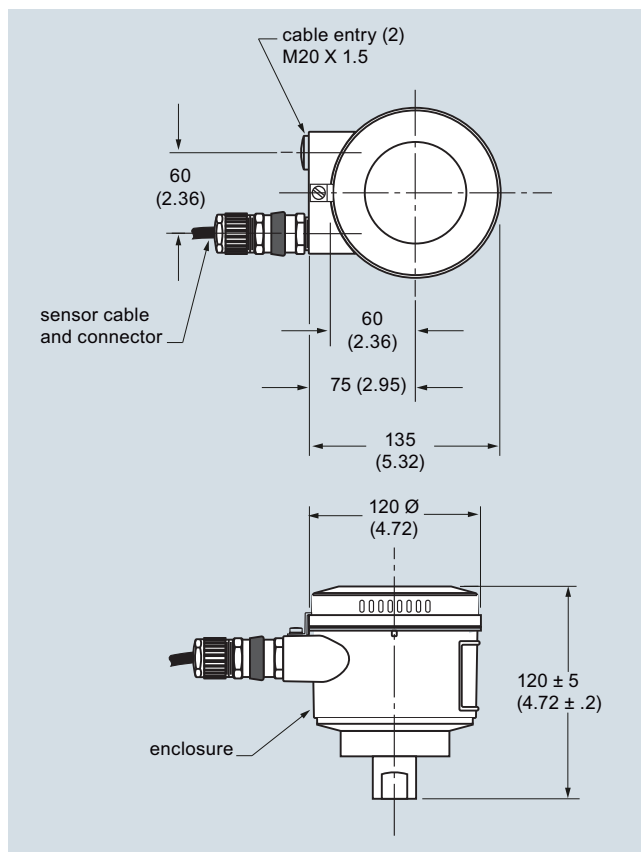
ExtensionTab - Bolt on (304 stainless steel)



Mounting Disc - Bonded or Welded (304 stainless steel)



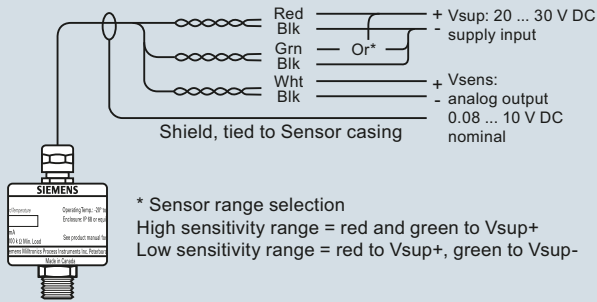
SITRANS AS100 accessories, dimensions in mm (inch)



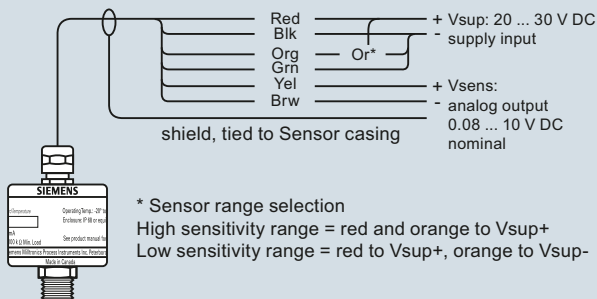
SITRANS AS100 (2D, 2G, XP version), dimensions in mm (inch)

Schematics

Standard temperature range



Extended temperature range



Interconnection

The longer the cable, the more susceptible it is to noise and earth loops. It is therefore recommended to use cable with heavy gauge conductors and good RF/electrical shielding (copper braid rather than drain and foil). A proper junction box close to the sensor is an ideal location not only to extend the cable but also to configure the wiring for high or low sensitivity range operation. The following table provides a guideline for suitable wire gauges where distances are considerable.

Max. distance between sensor and supply
(24 V or Control Unit).

AWG	Wire size		Distance	
	mm	mm ²	meters	feet
24	7 x 0.20	0.25	500	1 600
22	7 x 0.25	0.35	800	2 600
20	10 x 0.25	0.5	1 200	3 900

SITRANS AS100 connections

Process Protection

Acoustic sensors for material flow monitoring

SITRANS CU02 control unit

Overview



SITRANS CU02 is an alarm control unit, for use with SITRANS AS100 acoustic sensor, that provides reliable continuous protection for bulk solids flow.

Benefits

- 4 to 20 mA output
- Two programmable relays
- Adjustable independent time delay for each relay
- Adjustable start-up time delay
- DIN rail mounting provides easy installation
- Built-in password protection to parameters

Application

SITRANS CU02 receives a 0 to 10 V DC input signal from the SITRANS AS100 sensor, providing relay and analog outputs for interface into a process.

- Key applications: with SITRANS AS100 for bulk solids flow

Function

The system can be readily configured for set points indicating such conditions as high flow, low flow or no flow. Alternatively, it can be added to a control loop via a 4 to 20 mA isolated output for trend monitoring proportional to the signal from the sensor.

Two relays are fully programmable and independent of each other and can be used to operate an alarm or control device. Alarming may be provided above or below a setpoint or within a band. Readings are also displayed locally by the SITRANS CU02 on its LCD.

The SITRANS CU02 may be mounted up to 500 m (1 500 ft) from the sensor.

Technical specifications

Mode of operation	
Measuring principle	Controller for acoustic sensing (SITRANS AS100)
Typical application	Connects to SITRANS AS100 to detect burst filter bag
Input	
	0 ... 10 V DC, from sensor
Output	
Output signal	4 ... 20 mA isolated output, 2 Form C relays - latching or non-latching - 5 amp at 250 V AC non-inductive
Sensor excitation	26 V DC
Max. load	750 Ω
Rated operating conditions	
Installation conditions	
• Location	Indoor
Ambient conditions	
• Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)
• Relative humidity	80 % for temperatures up to 50 °C (122 °F)
• Degree of protection	IP20
• Installation category	II
• Pollution degree	2
Design	
Weight	550 g (18 oz)
Dimensions (W x H x D)	55 x 75 x 110 mm (2.2 x 3 x 4.4 inch)
Material enclosure	Polycarbonate
Mounting	DIN Rail (DIN 46277 or DIN EN 50022), or wall mount, up to 500 m (1 500 ft) from sensor
Cable	2 twisted pair, 24 AWG (22 mm ²), shielded. Mount up to 500 m (1 500 ft) from sensor
Display	Liquid crystal, three digits, 9 mm (0.35 inch), high and multi-segment graphic symbols for operation status
Power supply	
Supply voltage	100, 115, 200, 230 V AC ± 15 %, 50/60 Hz, factory set
Power consumption	Max. 10 VA
Approvals	CSA _{US/C} , CE, RCM, GOST-R

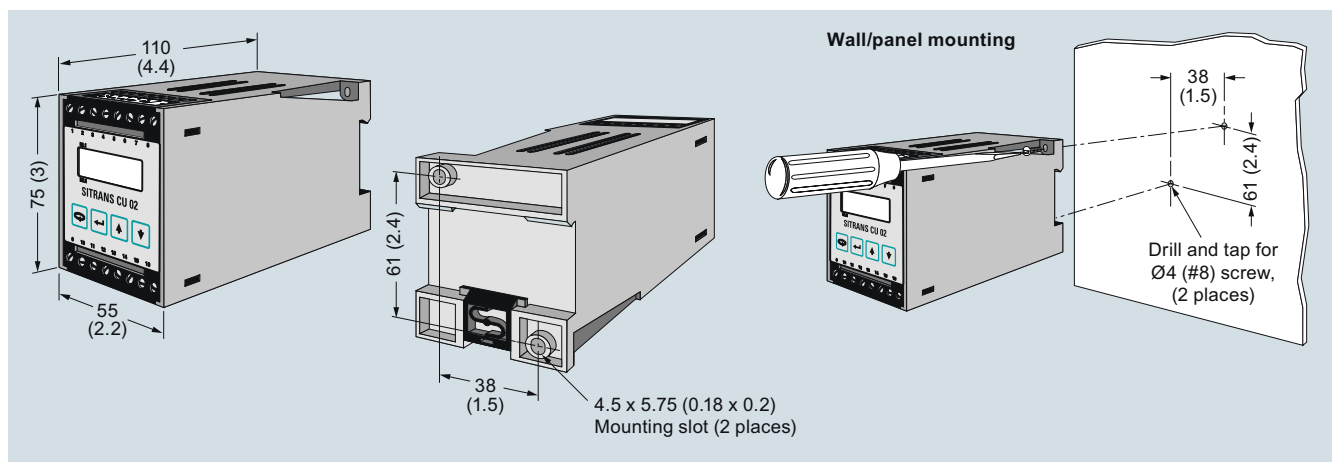
Selection and Ordering data	Article No.
SITRANS CU02 Control Unit Alarm control unit for use with SITRANS AS100 acoustic sensor to provide reliable continuous protection for bulk solid flow ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7 MH7 5 6 2 -
Power Supply 100 V AC 115 V AC 200 V AC 230 V AC	1 2 3 4
Enclosure Standard DIN Rail	A
Approvals CSA _{US/CA} , CE, RCM	A

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s). Manufacturer's test certificate: According to EN 10204-2.2	● C11 ● Y18
Acrylic coated, stainless steel tag [38 x 51 mm (1.5 x 2 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	
Operating Instructions English French German Note: The operating instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete operating instructions library.	Article No. 7ML1998-5DN01 7ML1998-5DN11 7ML1998-5DN31

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Dimensional drawings



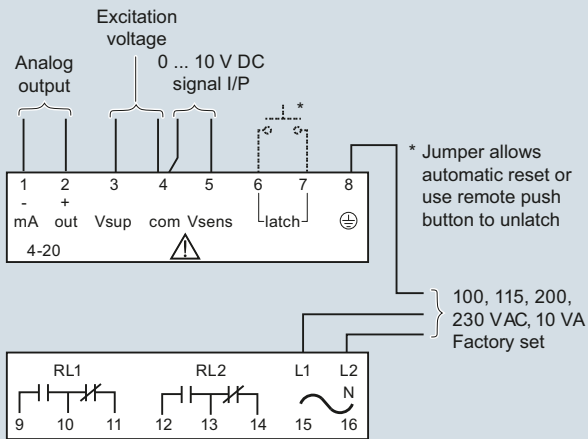
SITRANS CU02, dimensions in mm (inch)

Process Protection

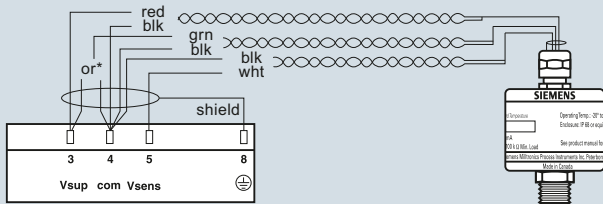
Acoustic sensors for material flow monitoring

SITRANS CU02 control unit

Schematics

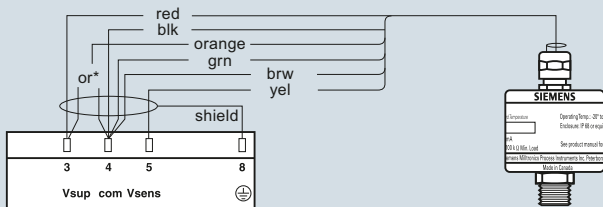


Standard temperature version



* Sensor range selection
 High sensitivity range = green to 'Vsups'
 Low sensitivity range = green to 'com'

Extended temperature version



* Sensor range selection
 High sensitivity range = orange to 'Vsups'
 Low sensitivity range = orange to 'com'

Mounting

Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
 This product is susceptible to electrostatic shock. Follow proper grounding procedures.

Interconnection

All field wiring must have insulation suitable for at least 250 V.
 Relay contact terminals are for use with equipment having no accessible live parts and wiring having insulation suitable for at least 250 V.
 The maximum allowable working voltage between adjacent relay contacts shall be 250 V. If sensor case is grounded, do not connect shield of cable to SITRANS CU02 ground terminal.

SITRANS CU02 connections

Milltronics MFA 4p motion failure alarm controller

Overview



MFA 4p motion failure alarm controller is a highly sensitive single setpoint motion sensor system, used with Milltronics MSP probes.

Application

The MFA 4p detects changes in the motion and speed of rotating, reciprocating or conveying equipment. It warns of equipment malfunction and signals through contacts to shut down machinery in case of a slowdown or failure. Its reliability makes it a cost-effective way to protect valuable process equipment.

The single setpoint system suits most industrial applications. This versatile unit can be used on tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps.

A special feature is the adjustable 0 to 60 second time delay, allowing the monitored device to accelerate to normal running speed before monitoring begins. A wide range of probes are available to suit specific needs, including high temperatures and corrosive installations. The CE approval allows the MFA 4p to consistently meet the needs of the mining aggregate, cement and other primary and secondary industries.

- Key Applications: tail pulleys, motor shaft sensing, screw conveyor flights, bucket elevators

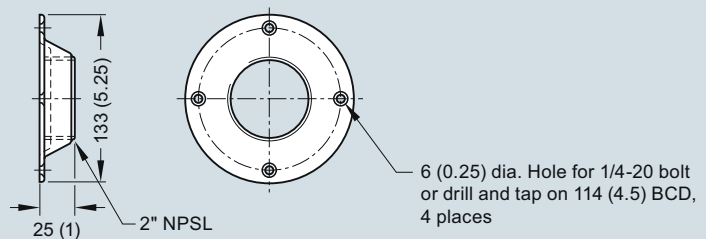
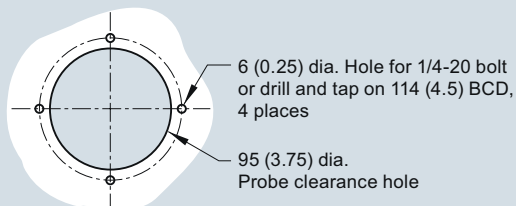
Benefits

- Up to 100 mm (4 inch) gap between target and probe
- Switch selectable overspeed or underspeed detection
- Setpoint adjustment 0.15 to 3 000 PPM (pulses/minute)
- Adjustable start-up time delay
- Visual indication of probe operation and relay status
- General purpose, suitable for majority of industrial applications; rugged probe designs provide unmatched reliability

Design

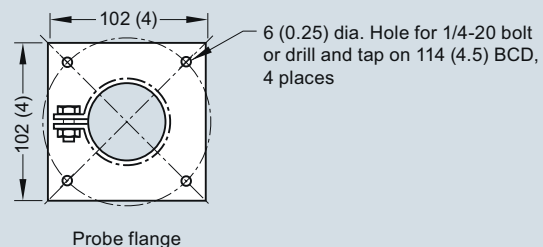
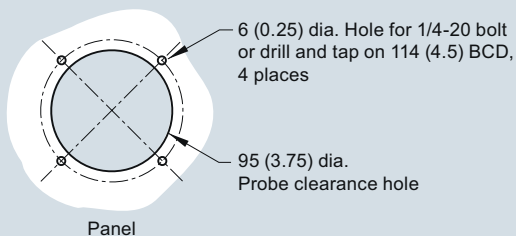
Mounting

Mounting for Milltronics MSP-12, MSP-3, XPP-5



Note: Mounting flange supplied with probe.

Mounting for Milltronics MSP-9



MSP-12, MSP-3, MSP-9, XPP-5 mounting, dimensions in mm (inch)

Process Protection

Motion sensors

Milltronics MFA 4p motion failure alarm controller

Probes



Standard Milltronics MSP-12

- Heavy-duty general purpose motion probe
- Long lasting aluminum body with internal amplifier
- Convenient mounting flange and locknut for fast installation and setup
- Temperature rating: -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67



High temperature Milltronics MSP-3

- Heavy-duty, high temperature aluminum probe designed to withstand operating temperatures from -50 ... 260 °C (500 °F)
- Cast aluminum probe with convenient mounting flange and locknut
- 1.5 m (5 ft) of high temperature PTFE cable provided. Up to 30 m (100 ft) may be used.
- Amplifier remote mounted in enclosure 140 x 140 x 100 mm (5.5 x 5.5 x 4 inch), available in cast aluminum (½" NPT conduit entry), painted steel (Type/NEMA 4, IP65 rating), or stainless steel (Type/NEMA 4X, IP65 rating)
- Amplifier temperature rating -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67



Milltronics XPP-5

- CSA hazardous approval (Class I, Div. 1, Groups A, B, C, D; Class II Div. 1, Groups E, F, G; Class III)
- Aluminum body that is fully potted
- Convenient mounting flange and locknut
- 3/4" NPT male hub connection
- Operating temperature from -40 ... 60 °C (-40 ... 140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67



Stainless high temperature Milltronics MSP-9

- Heavy-duty, high temperature 304 stainless steel probe
- Special construction allows operation of probe in environment from -50 ... 260 °C (500 °F)
- 1.5 m (5 ft) special high temperature PTFE cable provided. Up to 30 m (100 ft) may be used.
- Amplifier remote mounted in enclosure 140 x 140 x 100 mm (5.5 x 5.5 x 4 inch), available in cast aluminum (½" NPT conduit entry), painted steel (Type/NEMA 4, IP65 rating), or stainless steel (Type/NEMA 4X, IP65 rating)
- Enclosure rating: Type/NEMA 4X, 6, IP67
- Amplifier temperature rating -40 ... +60 °C (-40 ... +140 °F)



Milltronics RMA (Remote Mounted Amplifier)

- Available for internal mounting within Probe, or in enclosure for remote mounting
- Enclosures available in cast aluminum (½" NPT entry), painted steel (Type/NEMA 4 rating) or stainless steel (Type/NEMA 4X, IP65 rating)
- Operating temp. from -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67



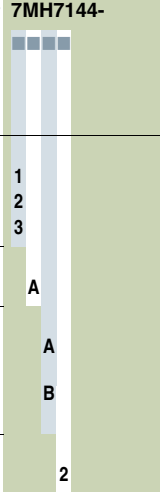
Motion probes




Technical specifications



Mode of operation	
Measuring principle	Motion monitor and alarm
Typical application	Monitoring loss of motion in tail pulley, screw flights, bucket elevators
Features	<ul style="list-style-type: none"> • Switch selectable overspeed or underspeed detection • Setpoint adjustment: 0.15 ... 3 000 PPM • Adjustable start-up time delay: 0 ... 60 seconds • Visual indication of probe operation and relay status
Output	2 relays working in unison, each providing 1 SPDT Form C relay contact, rated 8 A at 250 V AC resistive
Performance	
Repeatability	± 1 %
Dead band	± 0.25 %



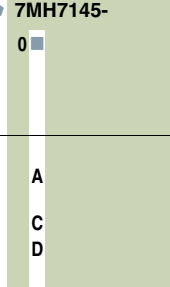
Dynamic Range	0 ... 7 200 PPM
Ambient Temperature Range	-20 ... +50 °C (-5 ... +122 °F)
Design	
Enclosure rating	Type 4X/NEMA 4X/IP65 (standard and optional stainless steel)
Enclosure dimensions	Type 4/NEMA 4/IP65 (optional mild steel) 160 x 240 x 82 mm (6.3 x 9.5 x 3.2 inch) Optional: mild steel or 304 (1.4301) stainless steel 203 x 254 x 102 mm (8 x 10 x 4 inch)
Enclosure material	Polycarbonate Optional: mild steel or stainless steel
Power Supply	100/115/200/230 V AC switch selectable, 50/60 Hz, 15 VA ± 10 % of rated voltage
Certificates and approvals	CE, RCM, CSA _{US/CA} , FM



Milltronics MFA 4p motion failure alarm controller



Selection and Ordering data	Article No.
MFA 4P Motion Failure Alarm Controller  7MH7144- A highly sensitive single setpoint motion sensor system, used with MSP probes.  Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Enclosure NEMA 4X, polycarbonate enclosure NEMA 4, painted mild steel enclosure NEMA 4X, 304 (1.4301) stainless steel enclosure	1 2 3
Input Voltage 100/115/200/230 V AC, 50/60 Hz, switch selectable	A
Speed detection version Standard, underspeed (U/S) or overspeed (O/S), switch selectable Slow speed (S/S), U/S or O/S detection, switch selectable (limit of 15 ppm)	A B
Approvals CE, RCM, CSA _{US/IC} , FM	2

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Manufacturer's test certificate: According to EN 10204-2.2	 C11
Acrylic coated, stainless steel tag [69 x 50 mm (2.7 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters), specify in plain text	 Y15
Painted mild steel, heated enclosure with viewing window for use down to -50 °C (-58 °F) (finished unit is mounted inside enclosure) 483 x 584 x 203 mm (19 x 23 x 8 inch)	A35
Stainless steel, sun/weather shield (finished unit is field mounted inside enclosure) [357 x 305 x 203 mm (14 x 12 x 8 inch)]	 S50
Operating Instructions English French Spanish German Note: The operating instructions should be ordered as a separate item on the order.	Article No. A5E33988839 7ML1998-5FM11 7ML1998-5FM21 7ML1998-5FM31
Spare Parts Relay Transformer Circuit Card, standard Circuit Card, Slow speed Lid with overlay for MFA 4p	7MH7723-1DW 7MH7723-1DX 7MH7723-1DU 7MH7723-1DV 7MH7723-1GY

 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Selection and Ordering data	Article No.
Milltronics RMA Remote Mounted Amplifier  7MH7145- Remote mounted amplifier for Milltronics MSP-3 and MSP-9 motion sensing probes.  Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Enclosure Aluminum enclosure, IP65, Type/NEMA 4X, ½" NPT entry Painted steel, Type/NEMA 4, IP65 rating 304 (1.4301) stainless steel enclosure, Type/NEMA 4X, IP65 rating	0 A C D

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Manufacturer's test certificate: According to EN 10204-2.2	 C11
Acrylic coated, stainless steel tag [38 x 51 mm (1.5 x 2 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	 Y18
Operating Instructions English French Spanish German Note: The operating instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete operating instructions library.	Article No. A5E33988839 7ML1998-5FM11 7ML1998-5FM21 7ML1998-5FM31
Spare Parts Card, RMA	7MH7723-1DT

 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Process Protection

Motion sensors

Milltronics MFA 4p motion failure alarm controller

Selection and Ordering data	Article No.
Milltronics Motion Sensing Probes A series of motion sensing probes used with the MFA 4p. Milltronics MSP-3: heavy-duty, high temperature aluminum Milltronics MSP-9: heavy-duty, high temperature stainless steel Milltronics MSP-12: heavy-duty, general purpose Milltronics XPP-5: hazardous rated Note: Milltronics MSP-3 and MSP-9 probes require the use of Milltronics RMA (amplifier)	7MH7146-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	

Cable Length	
Standard length (as described in Model options) ¹⁾	0
Add Order code Y01 and plain text: "Total cable length ... m"	
Extended cable length 2 ... 30 m (6.6 ... 98.4 ft) ²⁾	1
Extended cable length 31 ... 50 m (101.7 ... 164 ft) ⁴⁾	2
Extended cable length 51 ... 100 m (167.3 ... 328.1 ft) ⁴⁾	3

Model [standard cable length/type]	
MSP-3, 1/2" NPT cable inlet ³⁾ [1.5 m (5 ft) high temperature cable]	B
MSP-9 [1.5 m (5 ft) high temperature cable] ³⁾	D
MSP-12, 1/2" NPT cable inlet	E
XPP-5 [1.5 m (5 ft) cable, (CSA Class I, Groups A, B, C and D; Class II Groups E, F, and G)]	G
XPP-5 [10 m (32.8 ft) cable, (CSA Class I, Groups A, B, C, and D; Class II Groups E, F, and G)]	H
XPP-5 [15 m (49.2 ft) cable, (CSA Class I, Groups A, B, C and D; Class II Groups E, F, and G)]	J

Approvals	
CE, RCM	A
¹⁾ No Y01 needed in Order code for standard length ²⁾ Only available with model options B, D, G, H, J ³⁾ MSP-3 and MSP-9 probes required the use of RMA (amplifier) ⁴⁾ Available with Model options G, H, and J only	
● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).	
Total cable length: enter the total cable length in plain text description	● Y01
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	● Y17
Cable gland kit	● A57
Manufacturer's test certificate: According to EN 10204-2.2	● C11

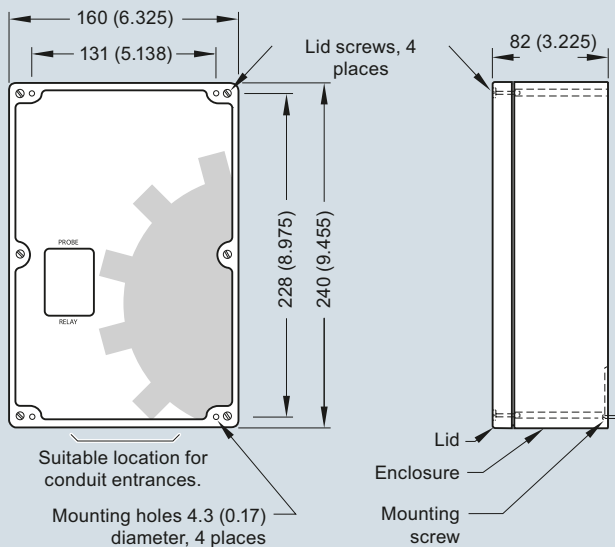
Operating Instructions	Article No.
English	A5E33988839
French	7ML1998-5FM11
Spanish	7ML1998-5FM21
German	7ML1998-5FM31
Note: The operating instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete operating instructions library.	

Spare Parts	
Locknut, for MSP-3, MSP-7, MSP-12, XPP-5	7MH7723-1CR
Mounting flange, for MSP-3, MSP-7, MSP-12, XPP-5	7MH7723-1CS
Mounting bracket for MSP-9	7MH7723-1CT
Lid, 1/2" NPT cable inlet for MSP-3, MSP-7, MSP-12	7MH7723-1CU
Lid for MSP-9	7MH7723-1CV
Lid gasket, for MSP-3, MSP-9	7MH7723-1CW
Lid gasket, for MSP-7, MSP-12	7MH7723-1CX
Motion cable gland adaptor kit	7MH7723-1JU

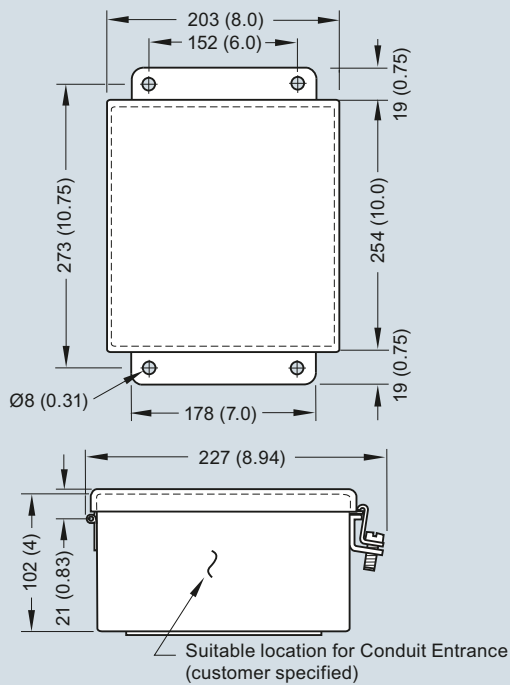
● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Dimensional drawings

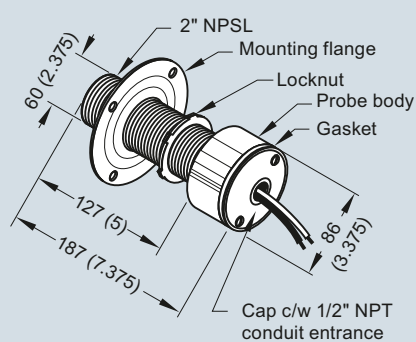
Type 4X/NEMA 4X/IP65 Polycarbonate Enclosure



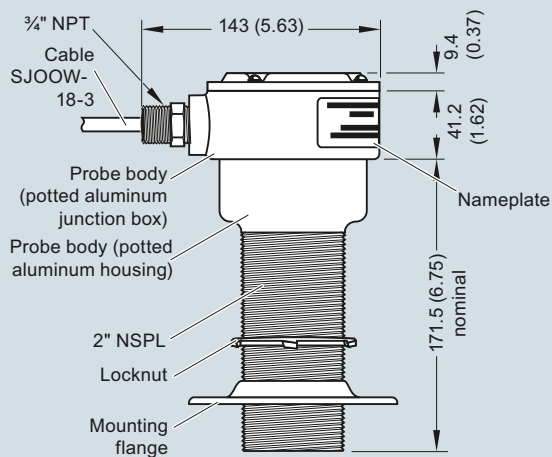
Type 4/NEMA 4/IP65 Painted Steel Enclosure & Type 4X/NEMA 4X/IP65 Stainless Steel Enclosure



Standard Probe MSP-12



Hazardous Locations XPP-5



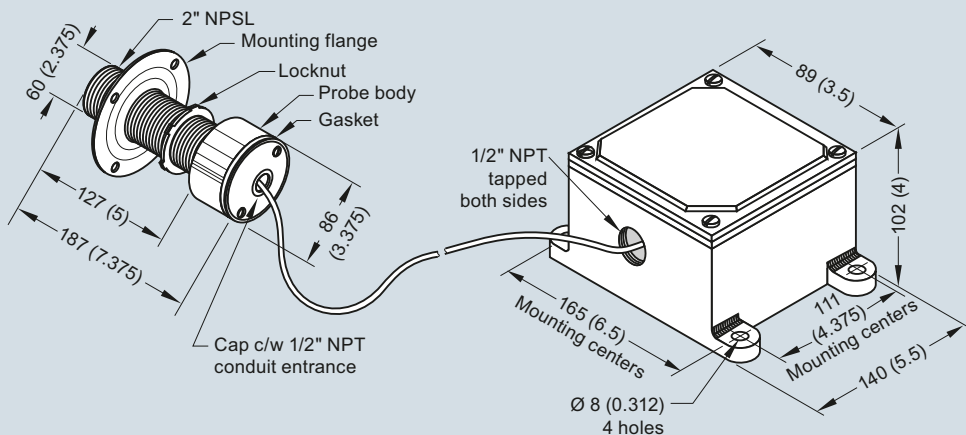
MFA 4p and probe, dimensions in mm (inch)

Process Protection

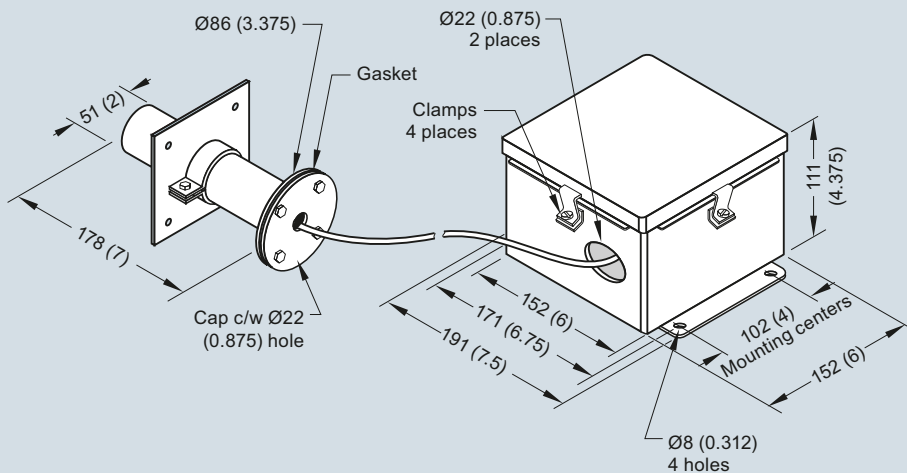
Motion sensors

Milltronics MFA 4p motion failure alarm controller

High temperature probe MSP-3



High temperature stainless steel probe MSP-9



Motion probes, dimensions in mm (inch)

Overview



Milltronics MSP-7 is a heavy-duty 3-wire motion sensor that provides an NPN open collector output to PLCs.

Application

The MSP-7 motion sensing probe can detect changes in the rotation and movement of ferrous equipment. When connected to a PLC it can warn of malfunction and signals to stop or slow down equipment, preventing costly failure or downtime. Its reliability makes it a very cost effective sensor.

The single setpoint system suits most industrial applications. This versatile unit can be used on tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps.

An NPN open collector 3-wire output allows for versatile connection to most PLC models and a large dynamic range ensures that the MSP-7 can detect changes in target speed for a variety of applications.

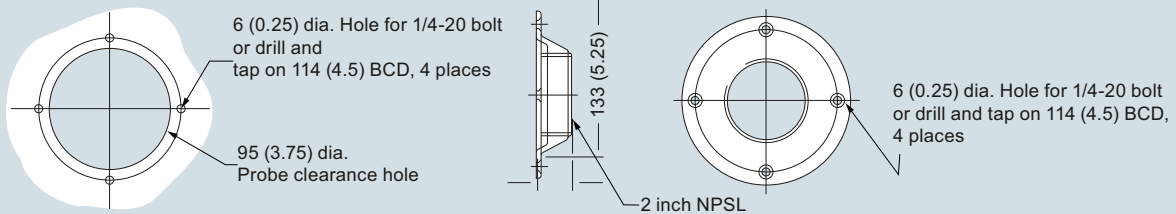
- Key Applications: tail pulleys, motor shaft sensing, screw conveyor flights, bucket elevators

Benefits

- Up to 100 mm (4 inch) gap between target and probe
- Corrosion resistant construction
- General purpose, suitable for majority of industrial applications; rugged probe designs provide unmatched reliability

Design

Mounting for Milltronics MSP-7



Mounting for Milltronics MSP-7, dimensions in mm (inch)

Technical specifications

Mode of operation		Performance	
Measuring principle	Magnetic	Repeatability	± 1 %
Typical application	Monitoring loss of motion in tail pulley, screw flights, bucket elevators	Dead band	± 0.25 %
Features		Dynamic Range	0 ... 7 200 PPM
	<ul style="list-style-type: none"> • Rugged corrosion resistant aluminum body • Low voltage operation • Large dynamic range • Threaded body for finite adjustment 	Ambient Temperature Range	-40 ... +60 °C (-40 ... +140 °F)
Output		Design	
	NPN open collector	Enclosure rating	Type 4X/NEMA 4X/IP67
		Power Supply	21 ... 28 V DC, 40 mA max.
		Certificates and approvals	CE, RCM

Overview



SITRANS WM100 is a heavy-duty zero-speed alarm switch. This non-contacting unit provides cost-effective equipment protection even in the harshest conditions.

Benefits

- Up to 100 mm (4 inch) gap between SITRANS WM100 and targets
- Rugged, low maintenance suitable for tough environments
- 1 SPDT Form C relay contact
- Provides cost-effective protection
- Visual indication of target triggered pulse

Application

This rugged unit is impervious to dust, dirt, build-up and moisture and is ideal for such primary industries as mining, aggregate, and cement. Operating where other systems are prone to failure, the non-contacting design eliminates the need for lubricating, cleaning and part replacement. Downtime and clean-up expenses associated with conveying equipment failure are reduced by the SITRANS WM100. It alarms to minimize spillage, prevent extensive damage or even fire caused by belt slippage at the head pulley and warn against conveyor malfunction.

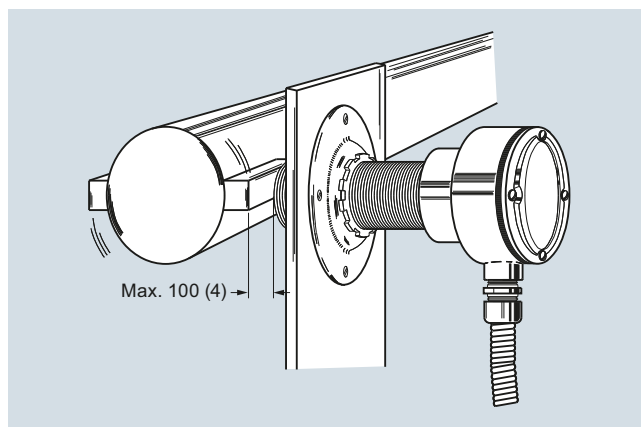
The SITRANS WM100 has built-in selectable start delays and 1 Form C relay contact. With an aluminum body, it operates from -40 to +60 °C (-40 to +140 °F).

- Key Applications: tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators

Design

Mounting

The WM100 probe should be mounted, using the supplied mounting flange, onto a vibration-free structure. The gap between the probe and the target should be sufficient such that there is no danger of the target damaging the probe. The maximum allowable gap is 100 mm (4 inch) from the face of the target to the face of the probe for 4.5 x 4.5 mm (3/16 x 3/16 inch) keyway. The WM100 is sensitive to lateral disturbances to its magnetic field. If the WM100 is responding to motion from an interfering target, move the WM100 or install a ferrous plate (steel) as a shield between the WM100 and the interfering target. Where possible, the probe should be mounted such that the cable inlet is pointing downward to avoid accumulation of condensation in the casing. Connection of the probe should be made via flexible conduit for easier removal or adjustment of the probe.



SITRANS WM100 mounting, dimensions in mm (inch)

Technical specifications

Mode of operation	
Measuring principle	Disruption of magnetic field by ferrous target
Typical application	Monitors absence or presence of motion in harsh conditions
Output	
Contact	1 SPDT Form C dry relay contact, rated 5 A at 250 V AC, fail-safe operation
Time delay	Start up: 10 ... 14 seconds (5 ... 7 seconds with 12 ppm jumper installed)
Zero Speed (selected via a common jumper)	<ul style="list-style-type: none"> • 5 seconds ± 1 (minimum speed 10 ... 15 ppm) or • 10 seconds ± 2 (minimum speed 5 ... 7.5 ppm)
Rated operating conditions	
Operating temperature	-40 ... +60 °C (-40 ... +140 °F)
Design	
Probe body	Aluminum
Process mounting	2" NPSL
Connection box	Aluminum, 3/4" NPT conduit entrance, 5 screw terminals plus grounding terminal for electrical connection, max. 12 AWG (3.30 mm ²) wire size
Gasketing	Neoprene
Display	Red LED for verification of pulses
Enclosure rating	Type NEMA 4x, 6, IP67
Dynamic range	Minimum 6 or 12 pulses per minute Maximum 3 000 pulses per minute
Shipping weight	2 kg (4.4 lb)
Power supply	<ul style="list-style-type: none"> • 115 V AC/50 ... 60 Hz, 7 VA • 230 V AC/50 ... 60 Hz, 7 VA • ± 10 % of rated voltage
Certificates and approvals	CSA _{US/C} , CE, RCM

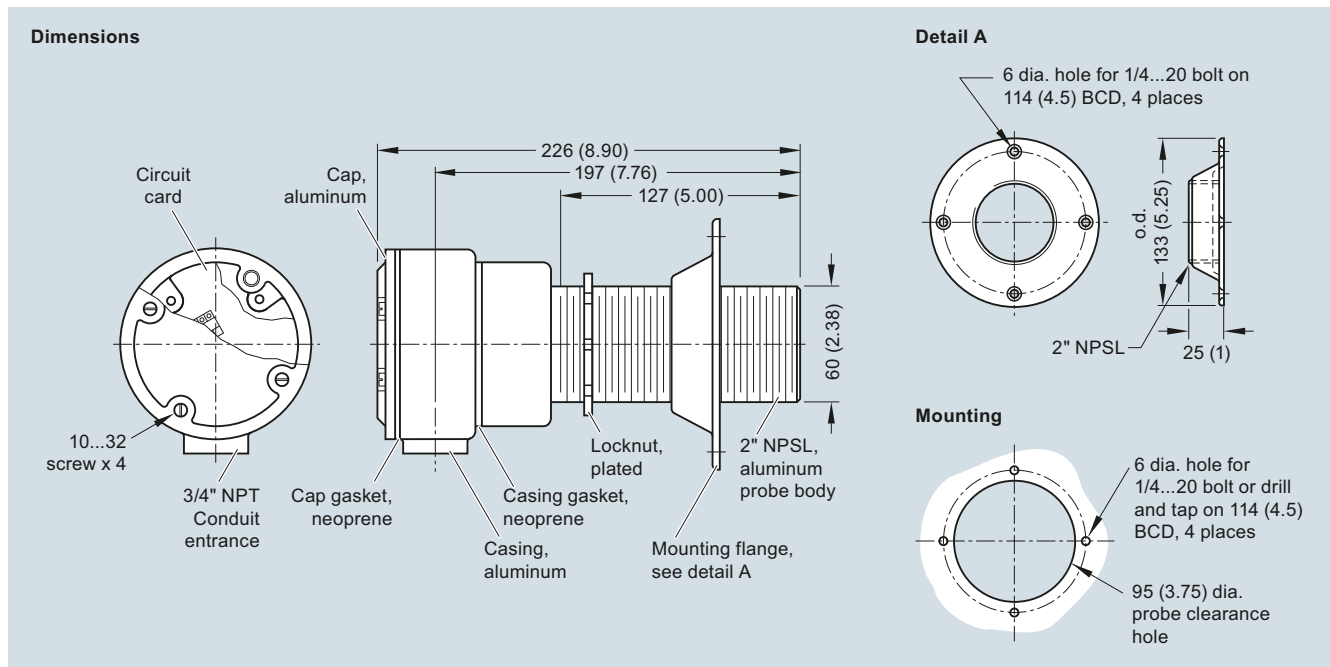
Process Protection

Motion sensors

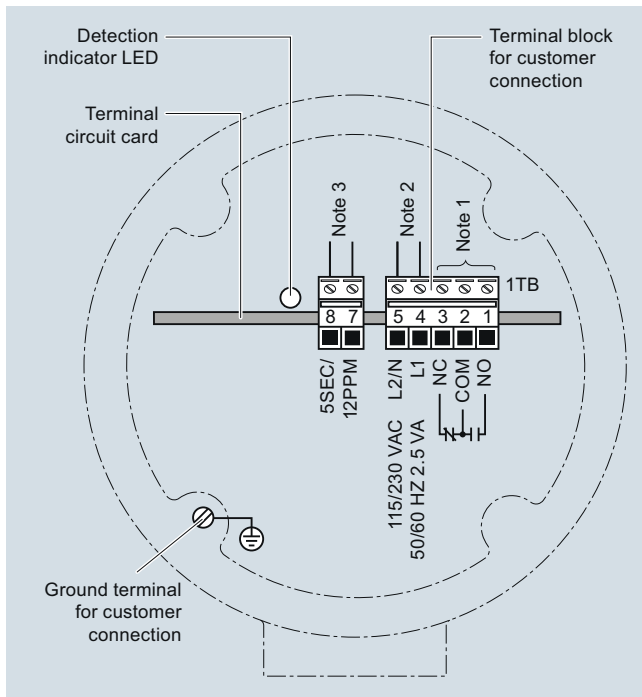
SITRANS WM100 motion sensor

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS WM100 A heavy-duty zero-speed alarm switch that does not require a controller. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7MH7158 - 0 A 0 0	Further designs Please add "-Z" to Article No. and specify Order code(s). Manufacturer's Test Certificate: According to EN 10204-2.2 Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	
Model 115 V AC 230 V AC	A B	Operating Instructions SITRANS WM100, English SITRANS WM100, German Note: The operating instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete operating instructions library.	C11 Y17 Article No. 7ML1998-5MW01 7ML1998-5MW31
		Locknut Mounting flange Motion cable gland adaptor kit	7MH7723-1CR 7MH7723-1CS 7MH7723-1JN

Dimensional drawings



SITRANS WM100 mounting, dimensions in mm (inch)

Schematics


SITRANS WM100 wiring

Notes:

1. Dry contacts shown in de-energized (alarm or shelf) state.
2. SITRANS WM100 is manufactured for either 115 or 230 V AC operation. Check WM100 nameplate for applicable voltage. Correct voltage must be supplied. Voltages lower than specified will result in an inoperative condition. Voltages higher than specified will severely damage unit.
3. For 5 second time delay and a minimum 12 ppm range, connect jumper across terminals 7 and 8. Without a jumper, the default is a 10 second time delay and a minimum 6 ppm range.

Process Protection

Notes

6

Supplementary Components



7/2	Product overview
	Isolating power supplies and Output isolators
7/4	SITRANS I100
7/7	SITRANS I200
	Displays
7/10	SITRANS RD100
7/12	SITRANS RD200
7/16	SITRANS RD300
	Remote data manager
7/19	SITRANS RD500
	WirelessHART products
7/24	SITRANS AW200 - WirelessHART adapter
7/30	SITRANS AW210 - WirelessHART adapter
7/34	IE/WSN-PA LINK




You can download all instructions, catalogs and certificates for Supplementary Components free of charge at www.siemens.com/processinstrumentation

Supplementary Components

Product overview

Overview

	Application	Description	Catalog page	Programming Software
Isolating power supplies and Output isolators				
	Isolating power supply for supplying 2- and 3-wire transmitters and for connecting mA sources in the hazardous area	SITRANS I100 Isolating power supply with HART for rail mounting, with intrinsically-safe input.	7/4	-
	Output isolator for controlling valve positioners, i/p converters or indicators in the hazardous area	SITRANS I200 Output isolator with HART for rail mounting, with intrinsically-safe output	7/7	-
Displays				
	2-wire loop powered, NEMA 4X enclosed remote digital display for process instrumentation and for hazardous locations	SITRANS RD100 <ul style="list-style-type: none"> Versatile loop-powered meter that displays process variables in level, flow, pressure, temperature and weighing applications FM and CSA approved device that can be installed in a range of environments, including hazardous areas Large, easy-to-read display Easy to install and set up using quick two-step process 	7/10	-
	Universal input, panel mount remote digital display for process instrumentation. Supports RTD, TC, current and voltage inputs, and supporting software allows for remote configuration and data logging	SITRANS RD200 <ul style="list-style-type: none"> Universal remote display that accepts various inputs, making it an ideal fit for use with most field instruments Standard panel mount display with optional enclosures Two optional relays for alarm indication or process control applications Meter Copy feature to reduce setup time, cost and errors RD Software supporting remote configuration, monitoring and logging for up to 100 displays 	7/12	-
	A panel mount remote digital display for process instrumentation and acts as a multi-purpose, easy to use, rate/totalizer ideal for flow rate, total and control applications	SITRANS RD300 NEW <ul style="list-style-type: none"> A remote display for level, flow, pressure, weighing, and other process instruments Acts as a multi-purpose, easy to use, rate/totalizer ideal for flow rate, total, and control applications Data can be remotely collected, logged and presented on your local computer using the free downloadable RD software. Accepts a single or dual input of current and voltage 	7/16	-
Remote data manager				
	Remote data monitoring providing integrated web access, alarm event handling, and data capture for instrumentation	SITRANS RD500 <ul style="list-style-type: none"> Supports up to 128 devices with the flexible I/O modules and Modbus serial devices, including field instruments Out-of-the-box operation, no software required, works with standard web browser Support Ethernet, cellular and PSTN communication Data and alarming through FTP, Email, SMS, HTML and Modbus TPC Up to 2 GB of data logging memory 	7/19	-

	Application	Description	Catalog page	Programming Software
WirelessHART products				
	WirelessHART adapter to enable standard 4 ... 20 mA or HART devices to wireless communication	SITRANS AW200 - WirelessHART adapter <ul style="list-style-type: none"> • Makes isolated information in HART field instruments airborne • Permits predictive instead of preventive maintenance strategies • Enables 4 ... 20 mA or HART devices to wireless communication • Up to 4 HART devices can be connected • Power up one connected field instrument 	7/24	SIMATIC PDM <ul style="list-style-type: none"> • Local with HART modem • Wireless via WirelessHART
	Explosion protected WirelessHART adapter to enable standard 4 ... 20 mA or HART devices to wireless communication	SITRANS AW210 - WirelessHART adapter <ul style="list-style-type: none"> • Wireless transfer of the process variable of a 4 to 20 mA device via direct connection • Wireless communication with up to 8 HART field devices in multidrop mode • Suitable for use in explosion-protected areas • Loop-powered or external power supply • Supports burst mode and event notification for adapters and connected devices 	7/30	SIMATIC PDM <ul style="list-style-type: none"> • Local with HART modem • Wireless via WirelessHART
	Gateway for the connection of WirelessHART field devices (HART V7.1) to Industrial Ethernet.	IE/WSN-PA LINK <ul style="list-style-type: none"> • Connection of up to 100 WirelessHART devices • Approved for operation in hazardous areas in Zone 2 • Open TCP/IP communication and Modbus TCP via the Ethernet interface • Can be used with HART-OPC servers of the HART Communication Foundation 	7/34	-

Supplementary Components

Isolating power supplies and Output isolators

SITRANS I100

Overview



Analog input 0/4 to 20 mA

The isolating power supplies are used for the intrinsically safe operation of 2- and 3-wire transmitters and for connecting to intrinsically safe mA sources.

The 2- and 3-wire transmitters are supplied with auxiliary power from the transmitter supply unit.

For 2-wire transmitters the isolators transfer the HART communication signal bidirectionally.

Benefits

- Active output 0/4 to 20 mA
- Suitable for 2-, 3-wire transmitters, 2-wire HART transmitters and mA sources
- Intrinsically safe input [Ex ia] IIC
- Galvanic isolation between input, output and auxiliary power
- Open-circuit and short-circuit monitoring and messaging for input and output (can be switched off)
- Installation possible in Zone 2 and Div. 2
- Can be used up to SIL 2 (IEC 61508)

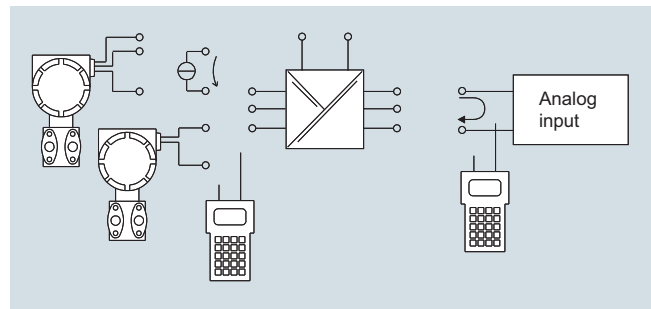
	Zones					
	0	1	2	20	21	22
Ex i interfaces	X	X	X	X	X	X
Installation in			X			X

Design

The HART isolating power supply is comprised of a compact plastic enclosure (IP30) and is equipped with push-in screw terminals.

On the front are a green LED for indicating the power supply status and a red LED for signaling errors.

The auxiliary power supply can be connected individually using push-in screw terminals or jointly for up to 40 units using pac-Bus.



SITRANS I100 isolating power supply, function block diagram

Technical specifications

SITRANS I100 Isolating Power Supplies with HART

Ex i input

Input signal	0/4 ... 20 mA with HART
Functional range	0 ... 24 mA
Max. input current for mA sources	50 mA
Transmitter supply voltage	≥ 16 V at 20 mA (for 2-, 3-wire)
Supply voltage residual ripple	≤ 25 mV _{eff}
No-load voltage	≤ 26 V
Short-circuit current	≤ 35 mA
Input resistance (AC impedance HART)	≈ 500 Ω
Input resistance for mA sources	30 Ω
Communication signal (on 2-wire transmitters)	Bidirectional HART transmission, 0.5 ... 30 kHz

Output

Output signal	0/4 ... 20 mA with HART
Load resistance R _L	0 ... 600 W (terminal 1+/2-) 0 ... 379 W (terminal 3+/2-) (with internal 221 Ω resistance for HART)
Residual ripple	≤ 40 μA _{eff}
No-load voltage	≤ 15.5 V
Communication signal	Bidirectional HART transmission, 0.5 kHz ... 30 kHz
Response time (10 % ... 90 %)	≤ 25 ms
Transfer behavior Input/Output	1:1 (0 ... 20 mA --> 0 ... 20 mA, 4 ... 20 mA --> 4 ... 20 mA)

Measuring accuracy

Accuracy, typical data expressed as % of calibrated span at U _N , 23 °C	
Linearity error	≤ 0.1 %
Offset error	≤ 0.1 %
Temperature influence	≤ 0.1 %/10 K
Power supply effect within voltage range	≤ 0.01 %
Load resistance effect	≤ 0.02 %

Rated conditions		Error detection Ex i input	
Degree of protection of enclosure	IP30	• Open circuit	< 2 mA
Degree of protection of terminals	IP20	• Short-circuit	> 22 mA
Ambient conditions		• Output behavior	= Input signal
• Ambient temperature	-20 ... +60 °C/+70 °C (-4 ... +140 °F/+158 °F) (see "Operating instructions")	• Output current at $I_{in} = 0$	$I_{out} = 0$ mA
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)	Error detection output	
• Relative humidity (no condensation)	≤ 95 %	• Open circuit	< 2 mA
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 Use in the industrial environment	Error messaging Ex i input/output	
		• Settings (LF switch)	Activated/deactivated
		• Error indication	LED red "LF"
		Error messaging and power supply failure	<ul style="list-style-type: none"> • Contact (30 V/100 mA), closed to ground in case of error • pac-Bus, floating contact (30 V/100 mA)
Mechanical specifications		Certificates and approvals	
Screw terminals		Explosion protection ATEX	
• One-wire connexion		• EC type-examination certificate	DMT 03 ATEX E 010 X
- Rigid	0.2 ... 2.5 mm ² (0.00031 ... 0.0039 in ²)	• Degree of protection	II 3 (1) G Ex nA nC [ia] IIC T4 II (1) D [Ex iaD]
- Flexible	0.2 ... 2.5 mm ² (0.00031 ... 0.0039 in ²)	Installation	In Zone 2, Div. 2 and in the safe area
- Flexible with end ferrules (without/with plastic ferrule)	0.25 ... 2.5 mm ² (0.00039 ... 0.0039 in ²)	Other approvals	USA (FM) Kanada (CSA) Shipping (DNV)
• Two-wire connection		Safety specifications (CENELEC)	
- Rigid	0.2 ... 1 mm ² (0.00031 ... 0.00155 in ²)	• Max. voltage U_o	27 V
- Flexible	0.2 ... 1.5 mm ² (0.00031 ... 0.0023 in ²)	• Max. current I_o	88 mA
- Flexible with end ferrules	0.25 ... 1 mm ² (0.00039 ... 0.00155 in ²)	• Max. power P_o	576 mW
Weight	Approx. 160 g (0.35 lb)	• Max. connectable capacitance C_o for IIC/IIB	90 nF/705 nF
Type of installation	On DIN rail according to EN 50022 (NS35/15; NS35/7.5)	• Max. connectable inductance L_o for IIC/IIB	2.3 mH/14 mH
Mounting position	Vertical or horizontal	• Internal capacitance C_i and inductance L_i	Negligible
Enclosure material	PA 6.6	• Insulation voltage U_m	253 V
Fire protecting class (UL-94)	V0	• When connecting mA sources:	
		- Max. output voltage U_o	4.1 V
		- Max. connectable voltage U_i	30 V
		- Max. connectable current I_i	100 mA
		- Internal capacitance C_i and inductance L_i	Negligible
		• For more information and value combinations	See "Certification"
Auxiliary power			
Rated voltage U_N	24 V DC		
Voltage range	18 ... 31.2 V		
Residual ripple within voltage range	≤ 3.6 V _{SS}		
Rated current (U_N , 20 mA)	70 mA		
Power consumption (U_N , 20 mA)	1.7 W		
Power loss (at U_N , $R_L = 250 \Omega$)	1.3 W		
Operation indicator	Green "PWR" LED		
Reverse polarity protection	Yes		
Undervoltage monitoring	Yes (no faulty module/output states)		
Galvanic isolation			
• Test voltage according to EN 60079-11			
- Ex i input to output	1.5 kV AC		
- Ex i input to auxiliary power	1.5 kV AC		
- Ex i input to Error contact	1.5 kV AC		
• Test voltage according to EN 50178			
- Output to auxiliary power	350 V AC		
- Error contact to auxiliary power and output	350 V AC		

Supplementary Components

Isolating power supplies and Output isolators

SITRANS I100

Selection and Ordering data

Article No.

SITRANS I100 Isolating Power Supply with HART ▶ **7NG4124-0AA00**

For rail mounting, for supplying 2-/3-wire transmitters and for mA sources, output 0/4 ... 20 mA, with intrinsically safe input

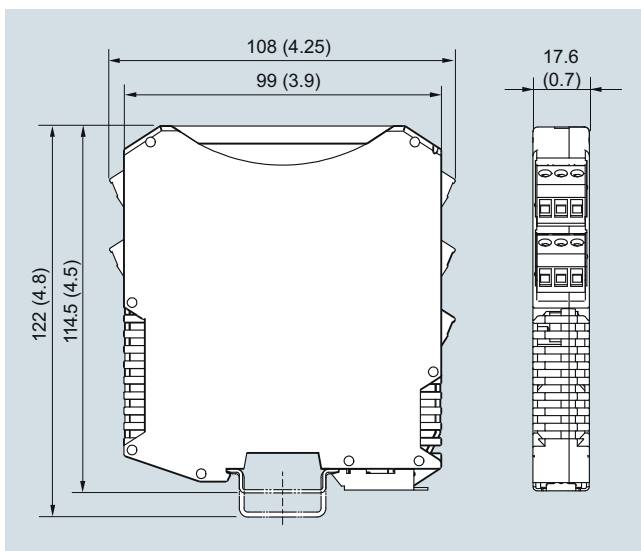
Accessories

pac-Bus basic set ▶ **7NG4998-1AA**
With 5 single elements and 1 terminal set (beginning and end)

pac-Bus extension set ▶ **7NG4998-1AB**
With 5 single elements

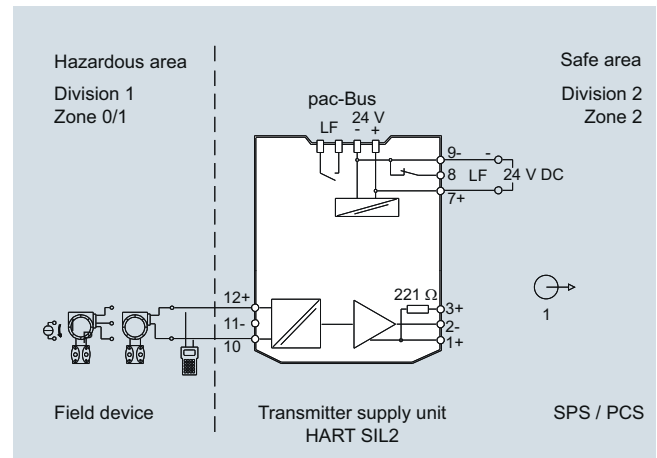
▶ Available ex stock.

Dimensional drawings

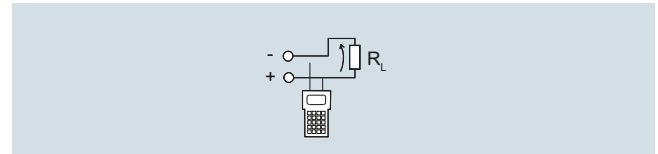


SITRANS I100 isolating power supply with HART, dimensions in mm (inch)

Schematics



SITRANS I100 isolating power supply with HART, connection diagram



SITRANS I100 isolating power supply with HART, output configuration

Overview



Analog output 0/4 to 20 mA for HART

The output isolators are used for the intrinsically safe operation of valve positioners, i/p converters or indicators.

Operation of intrinsically safe HART valve positioners (e.g. SIPART PS2 and SITRANS VP300) is also possible. The units transfer a superimposed HART communication signal bidirectionally.

Benefits

- For HART output signals 0/4 to 20 mA
- Intrinsically safe output [Ex ia] IIC
- Galvanic isolation between input, output and auxiliary power
- Open-circuit and short-circuit monitoring and messaging (can be switched off)
- Installation possible in Zone 2 and Div. 2
- Can be used up to SIL 2 (IEC 61508)

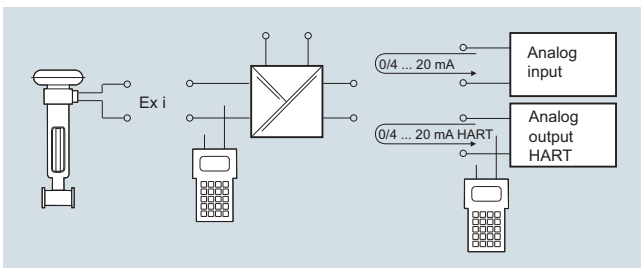
	Zones					
	0	1	2	20	21	22
Ex i interface	X	X	X	X	X	X
Installation in			X			X

Design

The HART output isolator is comprised of a compact plastic housing (IP30) and is equipped with push-in screw terminals.

On the front are a green LED for indicating the power supply status and a red LED for signaling errors.

The auxiliary power supply can be connected individually using push-in screw terminals or jointly for up to 40 units using pac-Bus.



SITRANS I200 output isolator, function block diagram

Technical specifications

SITRANS I200 output isolator with HART

Input

Input signal	0/4 ... 20 mA with HART
Functional range	0 ... 24 mA
Max. input current	50 mA
Input resistance (changeable switch LI)	225 Ω/550 Ω
Communication signal	Bidirectional HART transmission, 0.5 ... 30 kHz

Ex i output

Output signal	0/4 ... 20 mA with HART
Connectable load resistance	0 ... 800 Ω
Min. load resistance for short-circuit monitoring	150 Ω
Residual ripple	≤ 50 mV
No-load voltage	≤ 25.6 V
Response time (10 % ... 90 %)	≤ 25 ms
Transfer behavior Input/Output	1:1 (0 ... 20 mA --> 0 ... 20 mA, 4 ... 20 mA --> 4 ... 20 mA)

Measuring accuracy

Accuracy, typical data expressed as % of calibrated span at U_N , 23 °C

Linearity error	≤ 0.1 %
Offset error	≤ 0.1 %
Temperature influence	≤ 0.1 %/10 K
Power supply effect within voltage range	≤ 0.01 %
Load resistance effect	≤ 0.02 %

Rated conditions

Degree of protection of enclosure	IP30
Degree of protection of terminals	IP20
Ambient conditions	
• Ambient temperature	-20 ... +70 °C (-4 ... +158 °F) (see "Operating instructions")
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)
• Relative humidity (no condensation)	≤ 95 %
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 Use in the industrial environment

Supplementary Components

Isolating power supplies and Output isolators

SITRANS I200

Mechanical specification

Screw terminals

- One-wire connection

- Rigid 0.2 ... 2.5 mm²
(0.00031 ... 0.0039 in²)

- Flexible 0.2 ... 2.5 mm²
(0.00031 ... 0.0039 in²)

- Flexible with end ferrules
(without/with plastic ferrule) 0.25 ... 2.5 mm²
(0.00039 ... 0.0039 in²)

- Two-wire connection

- Rigid 0.2 ... 1 mm²
(0.00031 ... 0.00155 in²)

- Flexible 0.2 ... 1.5 mm²
(0.00031 ... 0.0023 in²)

- Flexible with end ferrules 0.25 ... 1 mm²
(0.00039 ... 0.00155 in²)

Weight

Approx. 160 g (0.35 lb)

Type of installation

On DIN rail according to EN 50022 (NS35/15; NS35/7.5)

Mounting position

Vertical or horizontal

Enclosure material

PA 6.6

Fire protecting class (UL-94)

V0

Auxiliary power

Rated voltage U_N

24 V DC

Voltage range

18 ... 31.2 V

Residual ripple within voltage range

≤ 3.6 V_{SS}

Rated current (U_N , 20 mA)

80 mA

Power consumption (U_N , 20 mA)

1.3 W

Power loss (at U_N , $R_L = 500 \Omega$)

1.1 W

Operation indicator

Green "PWR" LED

Reverse polarity protection

Yes

Undervoltage monitoring

Yes (no faulty module/output states)

Galvanic isolation

- Test voltage according to EN 60079-11

- Ex i output to input 1.5 kV AC

- Ex i output to auxiliary power 1.5 kV AC

- Error contact to Ex i output 1.5 kV AC

- Test voltage according to EN 50178

- Input to auxiliary power 350 V AC

- Error contact to auxiliary power and input 350 V AC

Error detection Ex i output

- Open circuit

> 10 k Ω

- Short-circuit

< 15 Ω

- Input behavior

> 6 k Ω

- Open-circuit detection only for input current

≥ 3.6 mA

- Settings (LF switch)

Activated/deactivated

- Error indication

LED red "LF"

- Error messaging and power supply failure

- Contact (30 V/100 mA), closed to ground in case of error

- pac-Bus, floating contact (30 V/100 mA)

Certificates and approvals

Explosion protection ATEX

- EC type-examination certificate

DMT 03 ATEX E 012 X

- Degree of protection

II 3 (1) G Ex nA nC [ia] IIC T4
II (1) D [Ex iaD]

Installation

In Zone 2, Div. 2 and in the safe area

Other approvals

USA (FM)
Canada (CSA)
Shipping (DNV)

Safety specifications (CENELEC)

- Max. voltage U_o

25.6 V

- Max. current I_o

96 mA

- Max. power P_o

605 mW

- Max. connectable capacitance C_o for IIC/IIB

103 nF/800 nF

- Max. connectable inductance L_o for IIC/IIB

1.9 mH/11 mH

- Internal capacitance C_i and inductance L_i

Negligible

- Insulation voltage U_m

253 V

- For more information and value combinations see "Certification".

Selection and Ordering data

Article No.

SITRANS I200 output isolator with HART

▶ **7NG4131-0AA00**

For rail mounting, input 0/4 ... 20 mA, output 0/4 ... 20 mA, intrinsically safe

Accessories

pac-Bus basic set

▶ **7NG4998-1AA**

With 5 single elements and 1 terminal set (beginning and end)

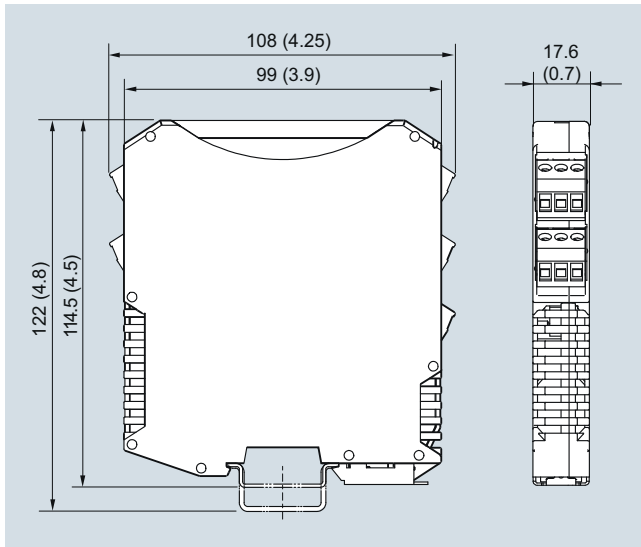
pac-Bus extension set

▶ **7NG4998-1AB**

With 5 single elements

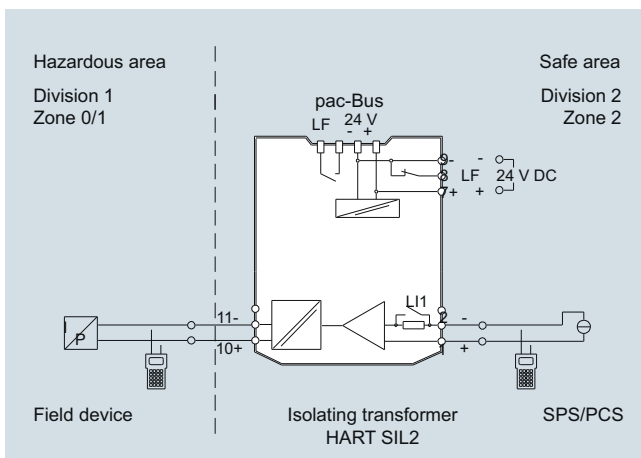
▶ Available ex stock.

Dimensional drawings



SITRANS I200 output isolator with HART, dimensions in mm (inch)

Schematics



SITRANS I200 output isolator with HART, connection diagram

Supplementary Components

Displays

SITRANS RD100

Overview



The SITRANS RD100 is a 2-wire loop powered, NEMA 4X enclosed remote digital display for process instrumentation.

Benefits

- Easy setup
- Approved for hazardous locations
- NEMA 4X, IP67 impact-resistant enclosure
- Simple two-step calibration
- Two modes of input allow for easy servicing, with no interruption of loop required

Application

The RD100 is very versatile. It can be installed indoors or outdoors, in hot or cold environments, and in safe or hazardous areas.

It has been approved by FM and CSA as Intrinsically Safe and non-incendive, and operates from -40 to +85 °C (-40 to +185 °F), adding only 1 V to the loop.

The RD100 has a large 1 inch (2.54 cm) high display making it easy to read.

Calibration consists of a quick, two-step process involving the adjustment of only two non-interacting potentiometers.

Key Applications

Remotely displays process variables in level, flow, pressure, temperature and weighing applications, in a 4 to 20 mA loop.

Technical specifications

Mode of operation	
Measuring principle	Analog to digital conversion
Measuring range	4 ... 20 mA
Measuring points	1 instrument only
Accuracy	± 0.1 % of span ± 1 count
Rated operating conditions	
Ambient conditions	
• Operating temperature range	-40 ... +85 °C (-40 ... +185 °F)
Design	
Weight	340 g (12 oz)
Material (enclosure)	Impact-resistant glass filled polycarbonate body and clear polycarbonate cover
Degree of protection	NEMA 4X, IP67

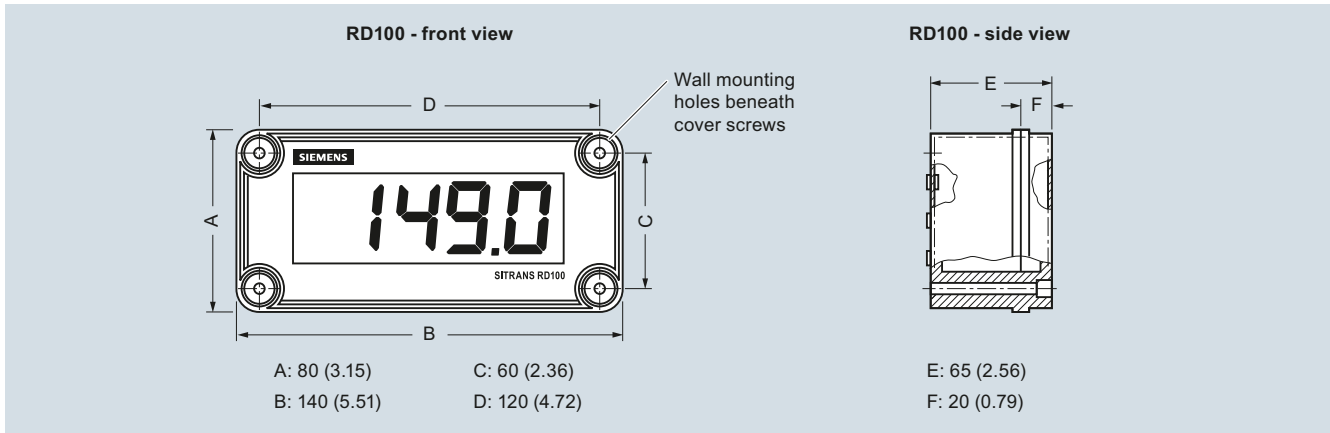
Power supply	External loop power supply	30 V DC max.
Display		<ul style="list-style-type: none"> • 1 inch (2.54 cm) high LCD • Numeric range from -1 000 ... +1 999
Certificates and approvals		
Hazardous	<ul style="list-style-type: none"> • Intrinsically Safe • Non-incendive 	<ul style="list-style-type: none"> • CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G T4 • CSA/FM Class I, Zone 0, Group IIC • CSA/FM Class I, Div. 2, Groups A, B, C, D • CSA/FM Class II and III, Div. 2, Groups F and G
Options	Mounting	<ul style="list-style-type: none"> • 2 inch (5.08 cm) pipe mounting kit (zinc plated or stainless steel) • Panel mounting kit

Selection and Ordering data	Article No.
SITRANS RD100 A 2-wire loop powered, NEMA 4X enclosed remote digital display for process instrumentation.	7ML5741- AA 00 - 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Conduit hole location (½ inch)	
None	▶ 1
Bottom	▶ 2
Rear	▶ 3
Top	▶ 4

- ▶ Available ex stock. For details see page 9/5 in the appendix.
- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

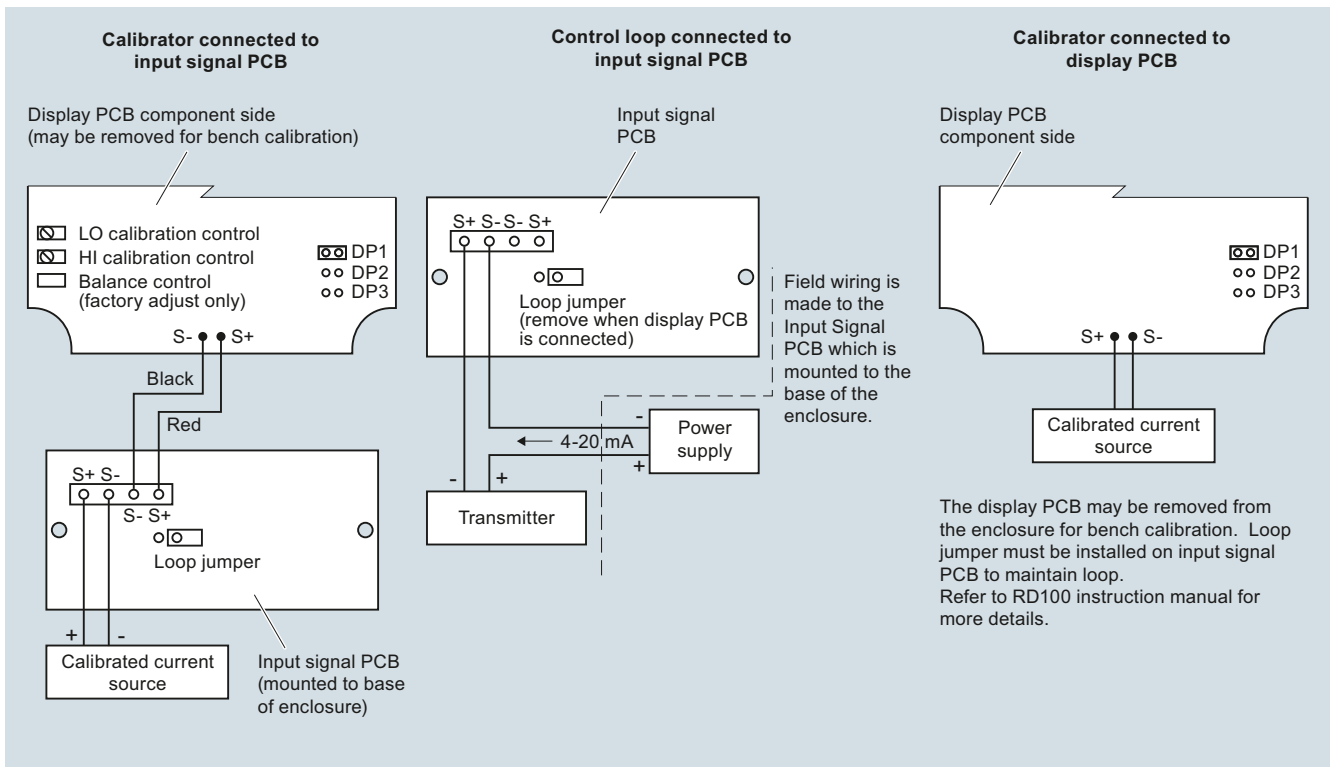
Selection and Ordering data	Article No.
Operating Instructions	
English	7ML1998-5JU01
French	7ML1998-5JU11
German	7ML1998-5JU31
Note: The Operating Instructions should be ordered as a separate line item. This device is shipped with the Siemens Milltronics manual CD containing Quick Starts and Operating Instructions.	
Accessories	
Panel mount kit	7ML1930-1BN
2 inch (5.08 cm) pipe mounting kit (zinc plated seal)	7ML1930-1BP
2 inch (5.08 cm) pipe mounting kit (stainless steel, Type 304, EN 1.4301)	7ML1930-1BQ

Dimensional drawings



SITRANS RD100, dimensions in mm (inch)

Schematics



SITRANS RD100 connections

Supplementary Components

Displays

SITRANS RD200

Overview



The SITRANS RD200 is a universal input, panel mount remote digital display for process instrumentation.

Benefits

- Easy setup and programming via front panel buttons or remotely using RD software
- Display readable in sunlight
- Universal input: accepts current, voltage, thermocouple and RTD signals
- Single or dual 24 V DC transmitter power supply
- Analog to Modbus RTU conversion as standard feature
- Two optional relays for alarm indication or process control applications
- Linear or square root function supported
- Meter Copy feature to reduce setup time, cost or errors
- RD software supporting remote configuration, monitoring and logging for up to 100 displays
- Other features include: 4 to 20 mA analog output option, supports pump alternation control, and optional NEMA 4 and 4X FIELD ENCLOSURES
- Large display option for improved visibility at greater distances

Application

The RD200 is a universal remote display for level, flow, pressure, temperature, weighing, and other process instruments.

Data can be remotely collected, logged and presented from as many as 100 displays on your local computer using the free downloadable RD software.

The display accepts a single input of current, voltage, thermocouple, and RTD. This makes the RD200 an ideal fit for use with most field instruments.

The RD200 can be set up as a standard panel mount, or combined with optional enclosures to allow it to house up to 6 displays.

Key Applications

Tank farms, pump alternation control, local or remote display of level, temperature, flow, pressure and weighing instrument values, PC monitoring and data logging with RD software.

Technical specifications

Mode of operation	
Measuring principle	Analog to digital conversion
Measuring points	<ul style="list-style-type: none"> • 1 instrument • Remote monitoring of 100 instruments with PC and RD software
Input	
Measuring range	
<ul style="list-style-type: none"> • Current • Voltage • Thermocouple temperature 	<ul style="list-style-type: none"> • 4 ... 20 mA, 0 ... 20 mA • 0 ... 10 V DC, 1 ... 5 V, 0 ... 5 V • Type J: -50 ... +750 °C (-58 ... +1 382 °F) • Type K: -50 ... +1 260 °C (-58 ... +2 300 °F) • Type E: -50 ... +870 °C (-58 ... +1 578 °F) • Type T: -180 ... +371 °C (-292 ... +700 °F) • Type T, 0.1 resolution: -180.0 ... +371 °C (-199.9 ... +700 °F) • 100 Ω RTD: -200 ... +750 °C (-328 ... +1 382 °F)
<ul style="list-style-type: none"> • RTD temperature 	
Output signal	
Output	<ul style="list-style-type: none"> • PDC output • 4 ... 20 mA (optional) • Modbus RTU
Relays	2 SPDT Form C relays, rated 3 A at 30 V DC or 3 A at 250 V AC, non-inductive, auto-initializing (optional)
Communications	<ul style="list-style-type: none"> • RS 232 with PDC or Modbus RTU • RS 422/485 with PDC or Modbus RTU
Accuracy	
4 ... 20 mA optional output	± 0.1 % FS ± 0.004 mA
Process input	± 0.05 % of span ± 1 count, square root: 10 ... 100 % FS
Thermocouple temperature input	<ul style="list-style-type: none"> • Type J: ± 1 °C (± 2 °F) • Type K: ± 1 °C (± 2 °F) • Type E: ± 1 °C (± 2 °F) • Type T: ± 1 °C (± 2 °F) • Type T, 0.1 Resolution: ± 1 °C (± 1.8 °F)
RTD temperature input	<ul style="list-style-type: none"> • 100 Ω RTD: ± 1 °C (± 1 °F)
Rated operating conditions	
Ambient conditions	
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Operating temperature range	0 ... 65 °C (32 ... 149 °F)
Design	
Weight	269 g (9.5 oz) (including options)
Material (enclosure)	<ul style="list-style-type: none"> • 1/8 DIN, high impact plastic, UL94V-0, color: gray • Optional plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 enclosures
Degree of protection	Type 4X, NEMA 4X, IP65 (front cover); panel gasket provided

Electrical connection	
• mA output signal	2-core copper conductor, twisted, shielded, 0.82 ... 3.30 mm ² (18 ... 12 AWG), Belden 8 760 or equivalent is acceptable
• Electrical connection and relay connection	Copper conductor according to local requirements, rated 3 A at 250 V AC
Power supply	
Input voltage option 1	85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max.
Input voltage option 2	12 ... 36 V DC; 12 ... 24 V AC, 6 W max.
Transmitter power supply	One or two isolated transmitter power supplies (optional)
• Single power supply	One 24 V DC ± 10 % at 200 mA max.
• Dual power supplies	Two 24 V DC ± 10 % at 200 mA and 40 mA max.
External loop power supply	35 V DC max.
Output loop resistance	<ul style="list-style-type: none"> • 24 V DC, 10 ... 700 Ω max. • 35 V DC (external), 100 ... 1 200 Ω max.
Displays and controls	
Display	<ul style="list-style-type: none"> • 14 mm (0.56 inch) high LED • 2X option for 30.5 mm (1.2 inch) high, red LED • Numeric range from -1 999 ... +9 999 • 4 digits, automatic lead zero blanking • 8 intensity levels
Memory	<ul style="list-style-type: none"> • Non-volatile • Stores settings for minimum of 10 years if power is lost
Programming	<ul style="list-style-type: none"> • Primary: front panel • Secondary: meter copy or PC with SITRANS RD software
Certificates and approvals	
CE, UL, cUL	
Options	
Enclosures	Plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 and 4X enclosures
Mounting	<ul style="list-style-type: none"> • 2 inch (5.08 cm) pipe mounting kit (zinc plated seal) • 2 inch (5.08 cm) pipe mounting kit (stainless steel, Type 304, EN 1.4301)

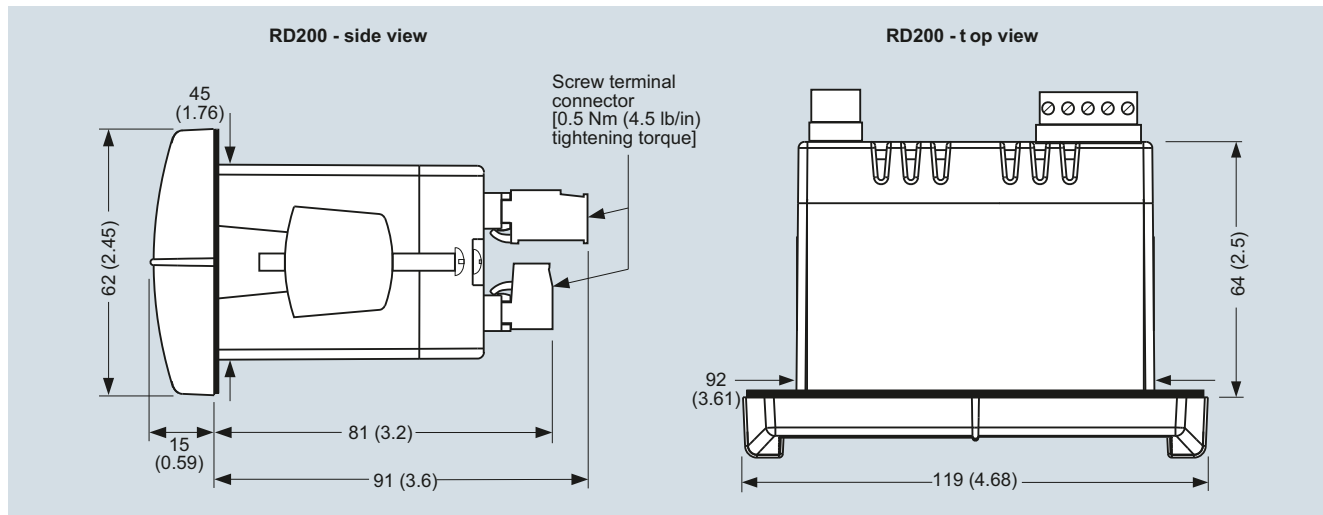
Supplementary Components

Displays

SITRANS RD200

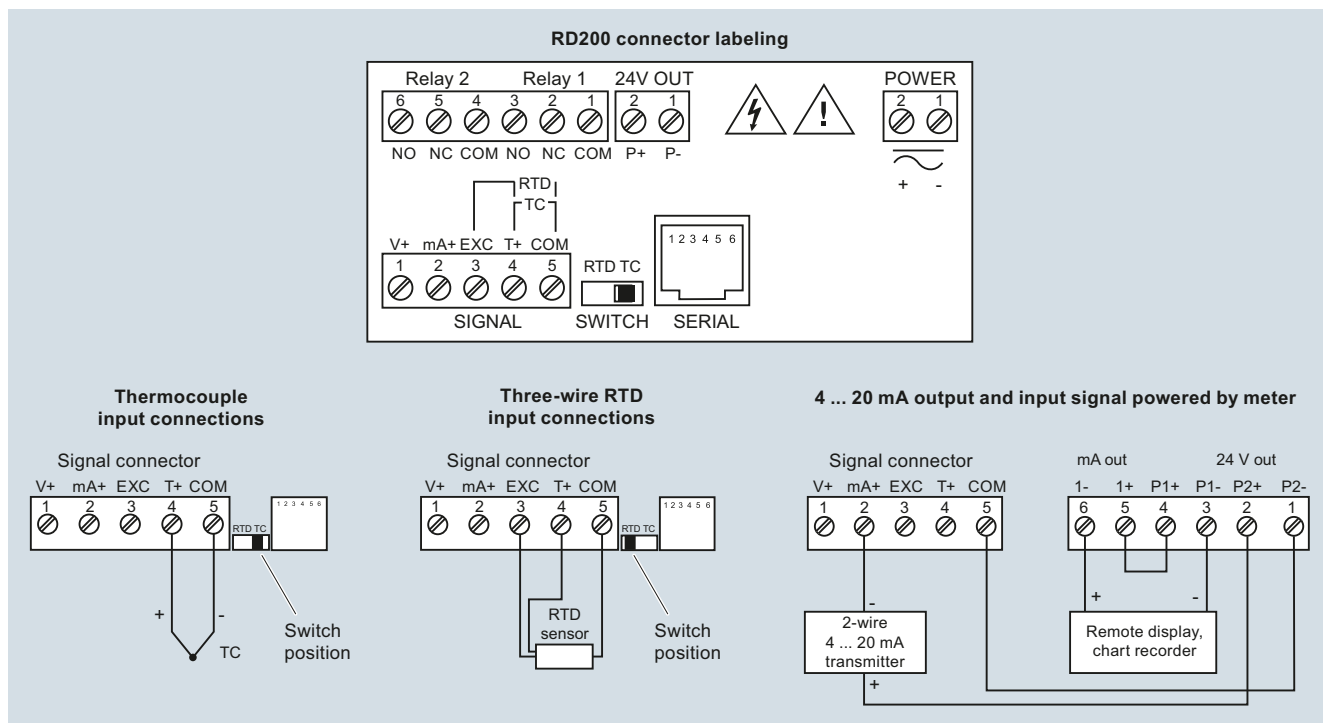
Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
SITRANS RD200 A universal input, panel mount remote digital display for process instrumentation. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML5740- 	Accessories SITRANS RD200 copy cable 2.1 m (7 ft) SITRANS RD200 RS 232 serial adapter (copy cable included) SITRANS RD200 RS 422/485 serial adapter (copy cable included) RS 232 to RS 422/485 isolated converter RS 232 to RS 422/485 non-isolated converter SITRANS RD200 RS 232 and RS 485 isolated multi-input adapter board USB to RS 422/485 isolated converter USB to RS 422/485 non-isolated converter USB to RS 232 converter RD Software CD for 1 ... 100 displays Low cost polycarbonate plastic enclosure for 1 display 2 inch (5.08 cm) pipe mounting kit (zinc plated seal) only available with 7ML1930-1CF 2 inch (5.08 cm) pipe mounting kit (stainless steel, Type 304, EN 1.4301) only available with 7ML1930-1CF	7ML1930-1BR 7ML1930-1BS 7ML1930-1BT 7ML1930-1BU 7ML1930-1BV 7ML1930-1BW 7ML1930-1BX 7ML1930-1BY 7ML1930-6AK 7ML1930-1CC 7ML1930-1CF 7ML1930-1BP 7ML1930-1BQ
Input voltage 85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max. ▶ 1 12 ... 36 V DC; 12 ... 24 V AC, 6 W max. ● 2		Thermoplastic enclosure For use with 1 display For use with 2 displays For use with 3 displays For use with 4 displays For use with 5 displays For use with 6 displays Stainless steel enclosure (Type 304, EN 1.4301)	7ML1930-1CG 7ML1930-1CH 7ML1930-1CJ 7ML1930-1CK 7ML1930-1CL 7ML1930-1CM
Transmitter supply None ● A Single 24 V DC transmitter supply ¹⁾ ▶ B Dual 24 V DC transmitter supply ¹⁾²⁾ ▶ C		Steel enclosure For use with 1 display For use with 2 displays For use with 3 displays For use with 4 displays For use with 5 displays For use with 6 displays	7ML1930-1CU 7ML1930-1CV 7ML1930-1CW 7ML1930-1CX 7ML1930-1CY 7ML1930-1DA
Output None ▶ A 2 relays ● B 4 ... 20 mA output ● C			
Communication Modbus enabled ▶ 0			
Approvals CE, UL, cUL ● 1			
Display Size Standard ▶ 0 2X option for 30.5 mm (1.2 inch) high, red LED ▶ 1			
¹⁾ Available with input voltage option 1 only ²⁾ Available with output option C only ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix. ▶ Available ex stock when configured with the following options only: Input voltage: 1, Transmitter supply: B, Output: A, Communication: 0. For details see page 9/5 in the appendix.			
Selection and Ordering data Operating Instructions English 7ML1998-5JS01 Spanish 7ML1998-5JS21 German 7ML1998-5JS31 Note: The Operating Instructions should be ordered as a separate line item. This device is shipped with the Siemens Milltronics manual CD containing Quick Starts and Operating Instructions.			
Other Operating Instructions SITRANS RD Enclosures, English 7ML1998-5JX01 SITRANS RD Enclosures, German 7ML1998-5JX31 SITRANS RD Serial communications accessories, English A5E31979195 SITRANS RD Serial communications accessories, German A5E31979197 SITRANS RD Software, English 7ML1998-5JW01 SITRANS RD Software, German 7ML1998-5JW31			

Dimensional drawings



SITRANS RD200, dimensions in mm (inch)

Schematics



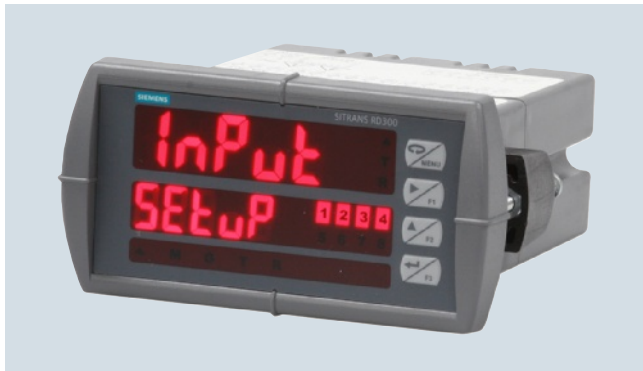
SITRANS RD200 connections

Supplementary Components

Displays

SITRANS RD300

Overview



The SITRANS RD300 is a panel mount remote digital display for process instrumentation and acts as a multi-purpose, easy to use, rate/totalizer ideal for flow rate, total, and control applications.

Benefits

- Easy setup and programming via front panel buttons or remotely using RD software
- Display readable in sunlight
- Input: accepts current and voltage
- Single or dual 24 V DC transmitter power supply
- Serial communication using built in protocol or Modbus RTU
- Supports up to 8 relays and 8 digital I/O for process control and alarming
- 32-point linearization, square root or exponential linearization
- Multi-pump alternation control
- Supports total, grand total or non-resettable grand total
- 9-digit totalizer with total overflow feature
- Large dual-line 6-digit display
- Configure, monitor, and datalog from a PC
- Dual-input option with math functions: addition, difference, average, multiplication, division, minimum, maximum, weighted average, ratio, concentration

Application

The RD300 is a remote display for level, flow, pressure, weighing, and other process instruments. This display also acts as a multi-purpose, easy to use rate/totalizer ideal for flow rate, total, and control applications.

Data can be remotely collected, logged and presented on your local computer using the free downloadable RD software.

The display accepts a single or dual input of current and voltage. This makes the RD300 an ideal fit for use with most field instruments.

The RD300 can be set up as a standard panel mount, or combined with optional enclosures to allow it to house up to 6 displays.

Key Applications

Tank farms, pump alternation control, local or remote display of level, flow, pressure and weighing instrument values, PC monitoring and data logging with RD software.

Technical specifications

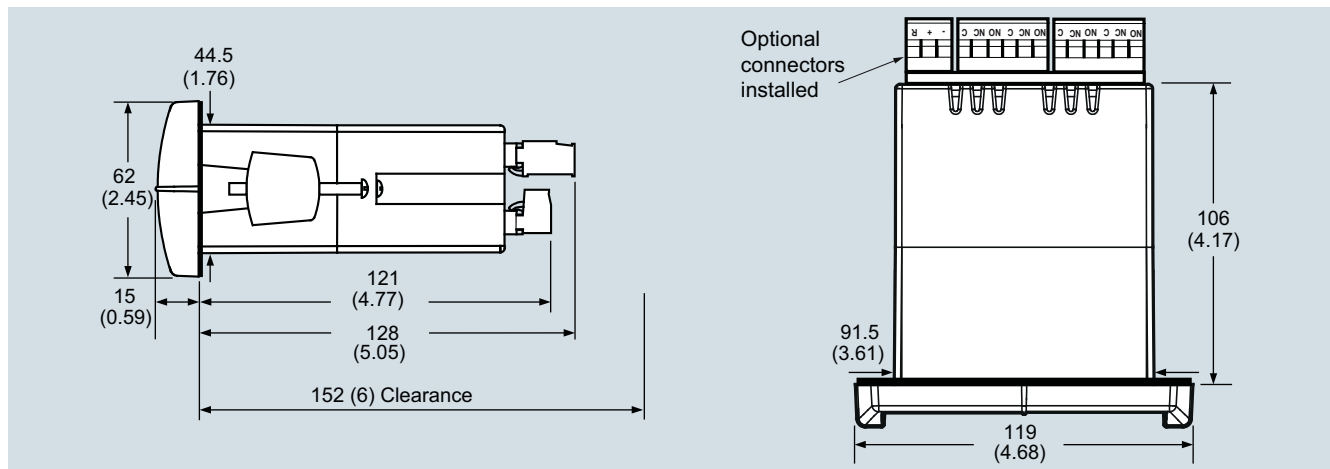
Mode of operation	
Measuring principle	Analog to digital conversion
Measuring points	1 or 2 instruments
Input	
Measuring range	
• Current	• 4 ... 20 mA, 0 ... 20 mA
• Voltage	• 0 ... 10 V DC, 1 ... 5 V, 0 ... 5 V
Output signal	
Output	• 4 ... 20 mA (optional) • Modbus RTU
Relays	2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A at 30 VDC and 125/250 VAC resistive load; 1/14 HP (50 W) at 125/250 V AC for inductive loads (optional)
Communications	• RS 232 with Modbus RTU • RS 422/485 with Modbus RTU
Accuracy	
4 ... 20 mA optional output	± 0.1 % FS ± 0.004 mA
Process input	± 0.05 % of span ± 1 count, square root: 10 ... 100 % FS
Rated operating conditions	
Ambient conditions	
Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
Operating temperature range	0 ... 65 °C (32 ... 149 °F)
Design	
Weight	269 g (9.5 oz) (including options)
Material (enclosure)	• 1/8 DIN, high impact plastic, UL94V-0, color: gray • Optional plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 enclosures
Degree of protection	Type 4X, NEMA 4X, IP65 (front cover); panel gasket provided
Electrical connection	
mA output signal	2-core copper conductor, twisted, shielded, 0.82 ... 3.30 mm ² (18 ... 12 AWG), Belden 8 760 or equivalent is acceptable
Electrical connection and relay connection	Copper conductor according to local requirements, rated 3 A at 250 V AC
Power supply	
Input voltage option	85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max. or jumper selectable 12/24 V DC ± 10 %, 15 W max.
Transmitter power supply	Terminals P+ & P-: 24 V DC ± 10 %, 12/24 V DC powered models selectable for 24, 10, or 5 V DC supply (internal jumper J4), 85 ... 265 V AC models rated at 200 mA max, 12/24 V DC powered models rated at 100 mA max, at 50 mA max. for 5 or 10 V DC supply.
External loop power supply	35 V DC max.
Output loop resistance	• 24 V DC, 10 ... 700 Ω max. • 35 V DC (external), 100 ... 1 200 Ω max.

Displays and controls	
Main Display	0.6 inch (15 mm) high, red LEDs
Second display	0.46 inch (12 mm) high, red LEDs, 6-digits: each (-99 999 ... 999 999)
Memory	<ul style="list-style-type: none"> • Non-volatile • Stores settings for minimum of 10 years if power is lost
Programming	<ul style="list-style-type: none"> • Primary: front panel • Secondary: meter copy or PC with SITRANS RD software
Certificates and approvals	
CE, UL, cUL	
Options	
Enclosures	Plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 and 4X enclosures

Selection and Ordering data		Article No.
Operating Instructions		
Single input process and flow rate/totalizer Mtr		
English		A5E31917845
French		A5E31948924
German		A5E31948919
Dual input process Mtr		
English		A5E33481367
German		A5E33481387
Note: The operating instructions should be ordered as a separate line on the order.		
Other Operating Instructions		
SITRANS RD DIN-Rail Mounting Kit, English		A5E31979181
SITRANS RD DIN-Rail Mounting Kit, German		A5E31979184
SITRANS RD Expansion Modules, English		A5E31979173
SITRANS RD Expansion Modules, German		A5E31979176
SITRANS RD Serial Communications Accessories, English		A5E31979195
SITRANS RD Serial Communications Accessories, German		A5E31979197
Accessories		
DIN-Rail Mounting Kit		7ML1930-6AB
4 Relays Expansion Module		7ML1930-6AC
4 Digital I/O Module		7ML1930-6AD
Dual output 4 ... 20mA expansion module for dual input meter		7ML1930-6AP
Meter Copy Cable		7ML1930-6AE
RS 232 Serial Adapter		7ML1930-6AF
RS 422/485 Serial Adapter		7ML1930-6AG
RD300 USB Serial Adapter		7ML1930-6AJ
USB to RS 232 Converter		7ML1930-6AK
Snubber		7ML1930-6AL
Plastic enclosure		
For 1 meter		7ML1930-6AM
For 2 meters		7ML1930-6AN
For 4 meters		7ML1930-1CK
For 5 meters		7ML1930-1CL
For 6 meters		7ML1930-1CM

Selection and Ordering data		Article No.
SITRANS RD300		7ML5744-
Dual line Remote digital display compatible with PI instruments		0 A
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Input voltage		
85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max.		1
12 ... 36 V DC; 12 ... 24 V AC, 6 W max.		2
Output		
None		A
2 Relays		B
4 Relays		C
4 ... 20 mA output		D
2 Relays and 4 ... 20 mA output		E
4 Relays and 4 ... 20 mA output		F
Type		
Single input process and flow rate/totalizer Mtr		A
Dual input process Mtr		B
Display		
Standard		0
SunBright		1
Approvals		
UL & C-UL & CE		0

Dimensional drawings



SITRANS RD300, dimensions in mm (inch)

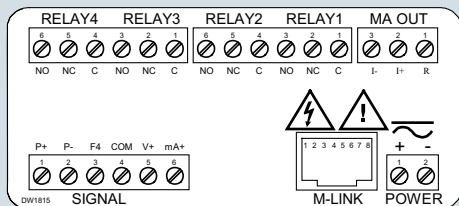
Supplementary Components

Displays

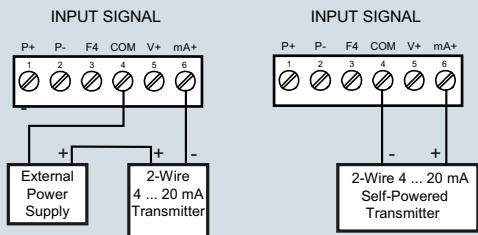
SITRANS RD300

Schematics

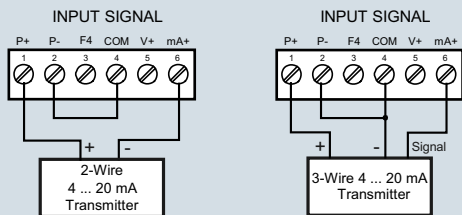
Connector labeling for fully loaded single input meter



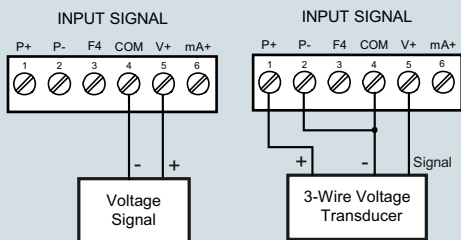
Transmitter powered by external supply or self-powered



Transmitter powered by internal supply



Voltage Input Connections



SITRANS RD300 connections

7

Overview



The SITRANS RD500 is a remote data manager providing remote monitoring through integrated web access, alarm event handling, and data capture for instrumentation and other devices.

Benefits

- RD500 supports report and alarm events via email, SMS, and FTP transfer
- Web provides worldwide access to instrument data and RD500 configuration and setup
- Simple configuration using a standard web browser, no programming or additional software required
- Offers scalability with optional I/O modules for current (4 to 20 mA), voltage (0 to 10 V), thermocouple (TC), resistance temperature detector (RTD), and digital input, output and counter
- 10 base-TI 100 Base-TX Ethernet and support for GSM, GPRS, 3G, and PSTN provide flexible remote communications options
- Supports up to 128 devices with the flexible I/O modules and supports addressing for Modbus serial devices via RS 232 and RS 485 serial ports
- Integrated FTP server and client supports FTP data synchronization to central servers
- Compact flash slot supports up to 2 gigabytes of expandable memory for data capture and storage, 1 gigabyte industrial compact flash card included
- Log files formats are CSV (comma separated values) for data files and HTML for report files
- Supports modbus TCP via Ethernet and GPRS for easy integration into control systems
- Optional 3G modem offers VPN support

Application

The RD500 is an easy-to-use remote data monitoring solution, using a web-based application and hardware modules. The unique modular approach allows a variety of process signals to be monitored, while the serial ports allow data to be collected from Modbus RTU devices.

The RD500 comprises a master communications module, and up to 16 slave modules. Various module types are available, allowing up to a maximum of 128 conventional inputs and outputs. The RD500's serial ports can support addressing for Modbus RTU slave devices including field instruments.

The RD500's built-in web server, FTP, and email client allows the process to be monitored remotely. Alarm notifications are communicated through email and SMS text messages to one or more

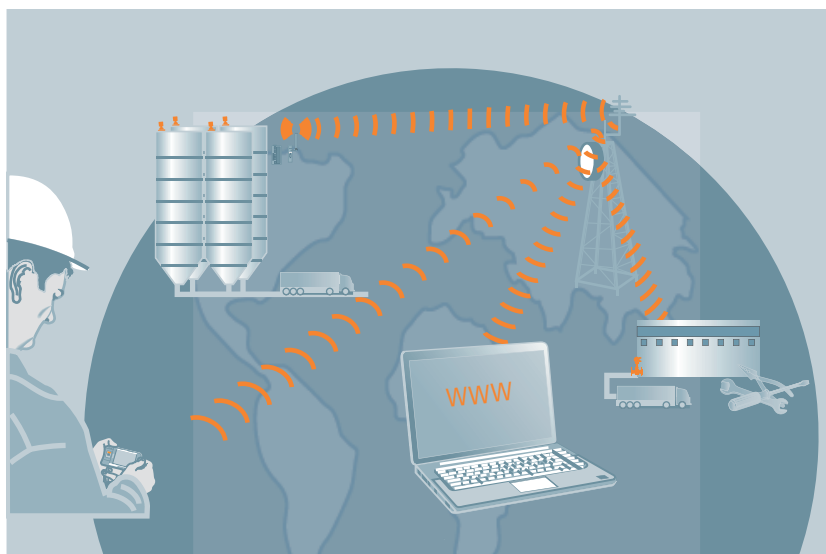
recipients to ensure that appropriate actions are taken by personnel.

The RD500 supports modems, providing flexibility for applications in which GSM/GPRS/3G cellular or landline connectivity is desired.

The RD500 is configured via a web-based interface - a standard browser is all the software you need to configure your system.

Key Applications

Remote monitoring, inventory management, web enabled instrumentation or other devices remote configuration and maintenance devices



With SITRANS RD500, monitor inventory levels, process, environmental, and remote maintenance applications, and get web access to most types of field instrumentation, including flow, level, pressure, temperature measurement, and weighing.

Supplementary Components

Remote data manager

SITRANS RD500

Technical specifications

Mode of operation

Measuring principle	Remote data monitor
Measuring points	<ul style="list-style-type: none"> Up to 128 standard input/outputs Addressing for Modbus serial devices

Input See table on page 7/21

Output See table on page 7/21

Accuracy See table on page 7/21

Rated operating conditions

Storage temperature range	-30 ... +70 °C (-22 ... +158 °F)
Operating temperature	0 ... 50 °C (32 ... 122 °F)
Operating and storage humidity	80 % max relative humidity, non-condensing, from 0 ... 50 °C (32 ... 122 °F)

Design

Material (enclosure)	High impact plastic and stainless steel
Installation category	I
Pollution degree	2
Weight	456.4 g (15.1 oz)
Mounting	Snaps onto standard DIN style top hat (T) profile mounting rails according to EN 50022 – 35 x 7.5 and – 35 x 15

Power

24 V DC ± 10 %
400 mA min. (1 module)
3.5 Amps max. (16 modules)
Must use Class 2 or SELV-rated power supply

Display

Status LEDs	<ul style="list-style-type: none"> STS - status LED indicates condition of master TX/RX - transmit/receive LEDs show serial activity Ethernet - link and activity LEDs CF - CompactFlash LED indicates card status and read/write activity
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Memory

On-board user memory	4 Mbytes of non-volatile Flash memory
On-board SDRAM	2 Mbytes
Memory card	CompactFlash Type II slot for Type I and Type II cards; 1 Gbytes (optional 2 Gbytes)

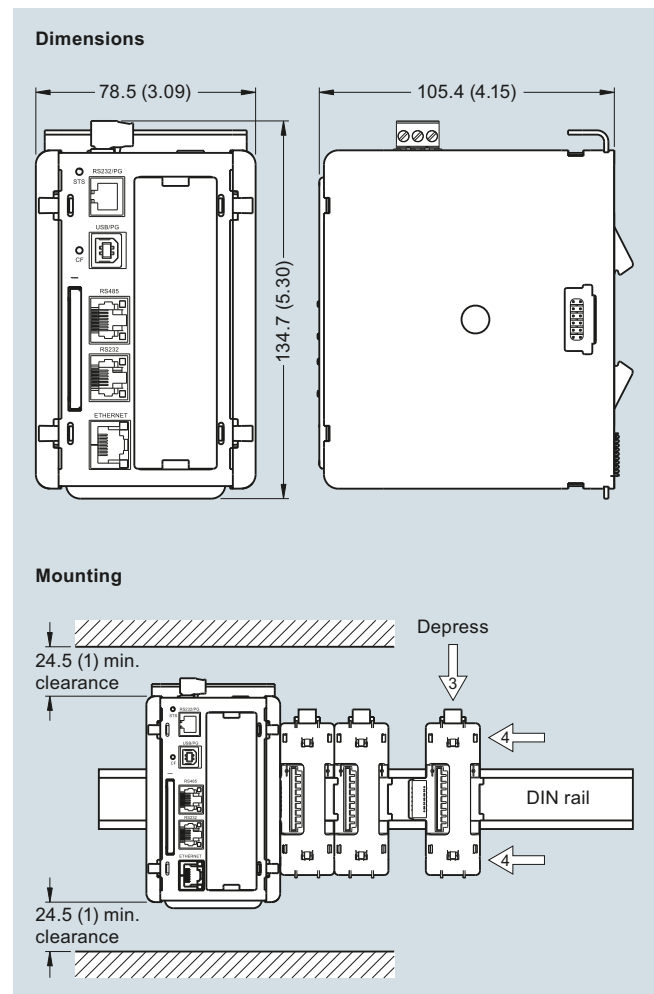
Certificates and approvals

Safety	<ul style="list-style-type: none"> UL listed to U.S. and Canadian safety standards for use in Class I, II and III, Division 1 and 2 hazardous locations CE, RCM
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Communication

USB/PG port	Adheres to USB specifications 1.1. Device only using Type B connection.
Serial ports	Format and baud rates for each port are individually software programmable up to 115 200 baud
RS 232/PG port	RS 232 port via RJ12
Comms ports	RS 422/485 port via RJ45 and RS 232 port via RJ 12
Ethernet port	10 BASE-T/100 BASE-TX; RJ45 jack is wired as a NIC (Network Interface Card)

Dimensional drawings



SITRANS RD500, dimensions in mm (inch)

SITRANS RD500 Module Specifications

	8 inputs, 6 solid state outputs	8 inputs, 6 relay outputs	8 channel, 4 ... 20 mA	8 channel ± 10 V	6 channel, RTD	8 channel thermocouple module
Article number	7ML1930-1ES	7ML1930-1ER	7ML1930-1EP	7ML1930-1EQ	7ML1930-1ET	7ML1930-1EU
Application	8 inputs, 6 outputs used to monitor contact or sensor inputs	8 inputs, 6 outputs used to monitor contact or sensor inputs	16 bit analog input module provides high density signal measurement for data monitoring applications and accepts 0/4 ... 20 mA process signals	16 bit analog input module provides high density signal measurement for data monitoring applications and accepts ± 10 V process signals	16 bit analog input module provides high-density signal measurement for data acquisition applications and accepts various RTD inputs	16 bit thermocouple input module provides high density signal measurement for data acquisition applications and accepts wide range of thermocouple types
Accuracy	Not applicable	Not applicable	± 0.1 % of span	± 0.1 % of span	± (0.2 % of span, 1 °C) 0 ... 50 °C (32 ... 122 °F); ± (0.1 % of span, 1 °C) 18 ... 28 °C (64 ... 82 °F); includes NIST conformity, A/D conversion errors, temperature coefficient and linearization conformity at 23 °C after 20 minutes warm-up	± (0.3 % of span, 1 °C); includes NIST conformity, cold junction effect, A/D conversion errors, temperature coefficient and linearization conformity at 23 °C after 20 minute warm-up
Mounting	Snaps onto standard DIN style top hat (T) profile mounting rails according to EN 50022 – 35 x 7.5 and - 35 x 15					
Inputs	Dip switch selectable for sink or source	Dip switch selectable for sink or source Max. voltage • 30 V DC, reverse polarity protected Off voltage • < 1.2 V On voltage • > 3.8 V Input frequency • Filter switch on: 50 Hz • Filter switch off: 300 Hz	8 single-ended Ranges • 0 ... 20 mA or 4 ... 20 mA Resolution • full 16-bit Sample time • 50 ... 400 ms depending on number of enabled inputs	8 single-ended Ranges • 0 ... 10 V DC or ± 10 V DC Resolution • full 16-bit Sample time • 50 ... 400 ms depending on number of enabled inputs	6 single-ended Resolution • full 16-bit Sample time • 67 ... 400 ms depending on number of enabled inputs	8 single-ended Resolution • full 16-bit Sample time • 50 ... 400 ms depending on number of enabled inputs
Outputs	Solid state output, switched DC, contact rating 1 A DC max.	Form A, NO pairs share common terminals: 1 & 2, 3 & 4, 5 & 6 current rating by pair: 3 Amps at 30 V DC/125 V AC resistive 1/10 HP at 125 V AC	Not applicable	Not applicable	Not applicable	Not applicable

Note:

To ensure the secure operation of a plant or machine it is necessary to take additional, suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Please find further information at: <http://www.siemens.com/industrialsecurity>

Supplementary Components

Remote data manager

SITRANS RD500

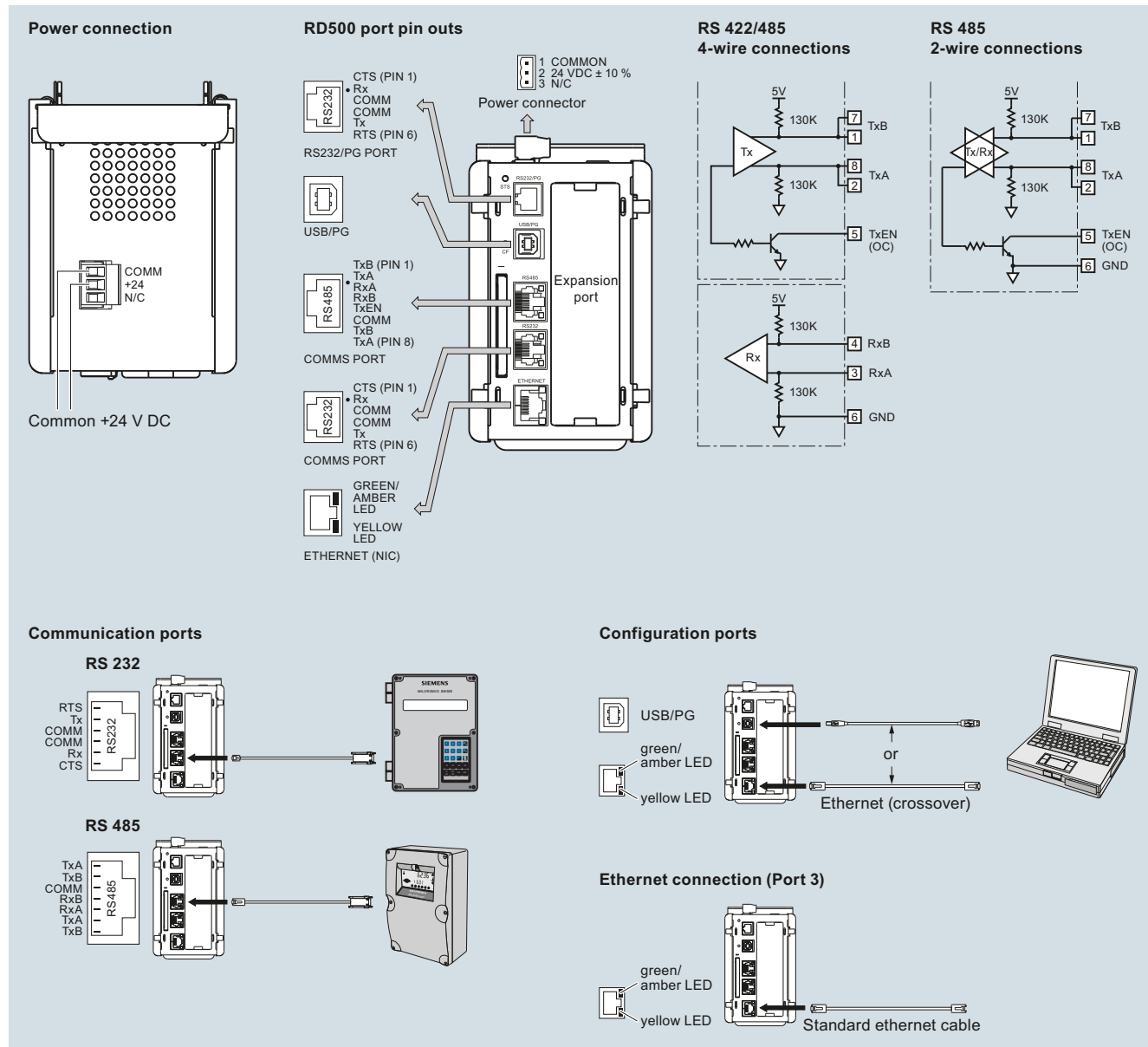
Selection and Ordering data	Article No.
SITRANS RD500	7ML5750-
The SITRANS RD500 is a remote data manager providing integrated web access, alarm event handling and data capture for instrumentation.	A 0 0 - 0
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Communications Connection	
Ethernet ¹⁾	1
Digital Communications to Instruments	
RS 485 Modbus RTU	A
¹⁾ Configuration limited to 16 modules. ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.	
Selection and Ordering data	Article No.
Input configuration modules	
Note: one RD500 supports 16 input modules maximum	
RD500 8 channel 0 (4) ... 20 mA input module	● 7ML1930-1EP
RD500 8 channel ± 10 V input module	● 7ML1930-1EQ
RD500 8 digital inputs/pulse counters, 6 relay outputs module	● 7ML1930-1ER
RD500 8 digital inputs/pulse counters, 6 solid state outputs module	● 7ML1930-1ES
RD500 6 channel input, RTD module	● 7ML1930-1ET
RD500 8 channel thermocouple module	● 7ML1930-1EU
Optional equipment	
3G external ethernet modem with antennae MTCBA-H4-EN2-P1	7ML1930-1GJ
Multitech GPRS modem, internal (including antennae)	7ML1930-1EY
Industrial CompactFlash card, 2 GB	7ML1930-1FB
Industrial CompactFlash card, 1 GB ¹⁾	7ML1930-1FC
RJ11 serial to terminal block RS 232	7ML1930-1FD
RJ45 serial to terminal block RS 485	7ML1930-1FE
GPRS Spare modem antenna	7ML1930-1FF
RD500 Spare Module base	7ML1930-1FG
RD500 Spare End terminator	7ML1930-1FH
Ethernet Cat 5e Red X/O cable for configuration, 1.52 m (5 ft)	7ML1930-1FM
USB cable type A/B	7ML1930-1FN
Remote mount external antenna 17 ft (5 m)	7ML1930-1FY
Operating Instructions	
Application manual, English	7ML1998-5MA01
Application manual, German	7ML1998-5MA31
Note: Additional Operating Instructions should be ordered as a separate line item. This device is shipped with the Siemens Milltronics manual CD containing Quick Starts and Operating Instructions.	

Selection and Ordering data	Article No.
Other Operating Instructions	
RD500 Remote Data Manager manual, English: web access, alarm event handling, and data capture	7ML1998-5MK01
RD500 Remote Data Manager manual, German: web access, alarm event handling, and data capture	7ML1998-5MK31
RD500 8 channel 0 (4) ... 20 mA input module manual, English	7ML1998-5MB01
RD500 8 channel 0 (4) ... 20 mA input module manual, German	7ML1998-5MB31
RD500 8 channel ± 10 V input module manual, English	7ML1998-5MC01
RD500 8 channel ± 10 V input module manual, German	7ML1998-5MC31
RD500 8 inputs, 6 relay outputs module manual, English	7ML1998-5MD01
RD500, 8 inputs, 6 relay outputs module manual, German	7ML1998-5MD31
RD500 8 inputs, 6 solid state outputs module manual, English	7ML1998-5ME01
RD500 8 inputs, 6 solid state outputs module manual, German	7ML1998-5ME31
RD500 6 channel input, RTD module manual, English	7ML1998-5MF01
RD500 6 channel input, RTD module manual, German	7ML1998-5MF31
RD500 8 channel thermocouple module manual, English	7ML1998-5MJ01
RD500, 8 channel thermocouple module manual, German	7ML1998-5MJ31
Accessories	
SITRANS RD100, loop powered display - see page 7/10	7ML5741-...
SITRANS RD200, universal input display with Modbus conversion - see page 7/12	7ML5740-...
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see page 7/16	7ML5744-...

¹⁾ 1 Gbyte industrial grade compact flash card included

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

Schematics



SITRANS RD500 connections

Supplementary Components

WirelessHART products

SITRANS AW200 - WirelessHART adapter

Overview



SITRANS AW200 WirelessHART adapter

The SITRANS AW200 WirelessHART adapter is a battery-powered communication component, which integrates HART and 4 to 20 mA field devices into a WirelessHART network. On the wireless communication side, the adapter supports the WirelessHART standard. HART and 4 to 20 mA field devices are connected on the field device side.

The SITRANS AW200 WirelessHART adapter

- Support the WirelessHART standard (HART V 7.1)
- Features a very high degree of security for wireless data transmission
- Integrates one 4 to 20 mA field device or up to four HART field devices (in multidrop mode) into a WirelessHART network
- Features intelligent energy management for the power supply of connected field devices
- Can be easily parameterized using SIMATIC PDM

Benefits

- High quality and service life
- Save on wiring costs for difficult installation conditions (e.g. moveable equipment parts) or for temporary installations
- Subsequent integration of an installed field device with HART interface into maintenance and diagnostic systems if the control system does not feature the required communication mechanisms. This application is described in Section 8 of this catalogue under "WirelessHART - Technical Description".
- Proven HART devices can continue to be used for wireless communication, without any limitations.
- Field devices with a 4 to 20 mA interface (without HART) can also be connected.
- Intelligent energy management to achieve the best possible life time for the installed battery unit.
- Optimum addition to wired communication and expansion of solution options for system solutions in process automation.
- Burst mode and event notification parameterization for the adapter and connected field devices.

Application

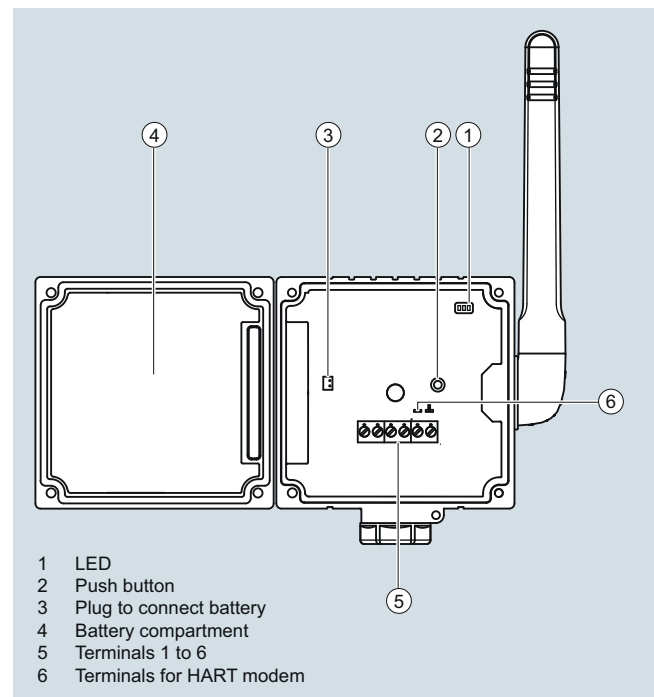
The WirelessHART adapter can be used in a number of different applications, e.g.

- Access to installed basis
Diagnostic information is obtained from existing wired HART devices through a permanent electrical connection of a WirelessHART adapter, and is sent to an asset management software near the system, e.g. SITRANS MDS.
- Status monitoring of the plant
Wireless devices are mounted at critical points in the plant, which are not usually connected to the control room due to difficult accessibility or extensive costs for wiring. Better data flow and diagnostics increase the system's reliability, transparency and safety.
- Process optimization
A temporary installation of a standard 4 to 20mA or HART device together with the WirelessHART adapter SITRANS AW200 allows flexible monitoring and plant optimization at lower costs and reduced effort.
- Process monitoring
Measured values from e.g. tanks or silos are transmitted to a superordinate system in regular time intervals, together with the device and battery status.

Design

The SITRANS AW200 WirelessHART adapter consists of

- A housing with mounted antenna
- Electronics
- A high-performance lithium battery unit



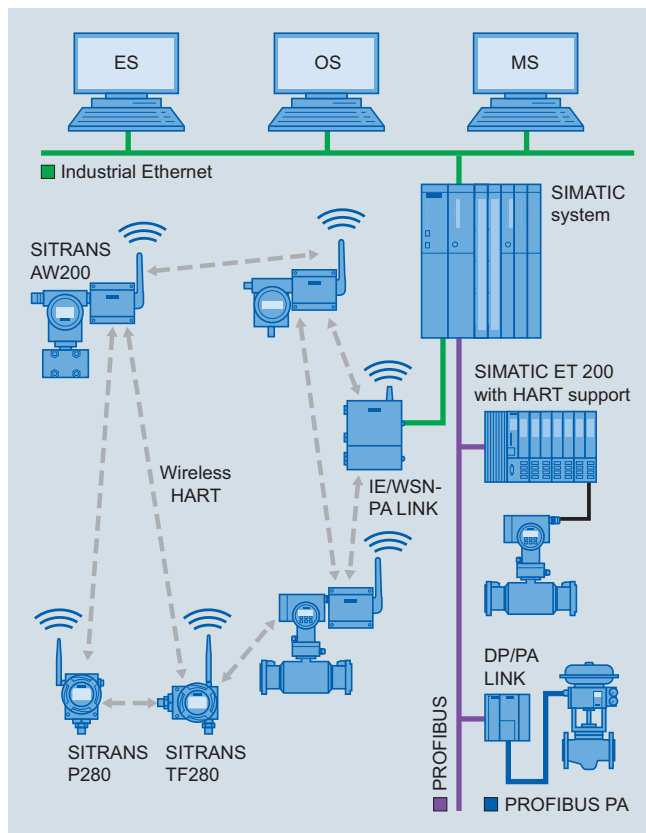
SITRANS AW200 WirelessHART adapter, assembly

The housing can be opened by loosening 4 screws. This allows to access the electronics and battery unit. The battery unit can be removed without the use of tools, since it is connected to the housing with clips.

The back of the housing features a connection part with a fixing nut onto which different replaceable connecting pieces can be screwed to mount the adapter directly on a field device.

The bottom of the housing contains an optional cable opening which can be used for a cable gland. In the case of an offset mounted adapter, it is possible to feed up to 2 cables.

Function



SITRANS AW200 WirelessHART adapter functional diagram

Measured values and diagnostic information of connected field devices with HART communication are transmitted via a wired connection to the WirelessHART adapter. The adapter transmits this information in the form of wireless signals to the IE/WSN-PA LINK, the Siemens WirelessHART gateway. From here, the information is available to the network of the system.

Where a field device with a 4 to 20 mA output signal is connected to the adapter, only the measured value will be transmitted.

Following parameterization and integration into a WirelessHART network, each WirelessHART adapter is able to recognize its neighbors. It notes the strength of the wireless signal, synchronizes itself, receives network information and then establishes connections to the neighbors in the wireless network. A WirelessHART network organizes itself. Manual settings for organizational purposes are not required.

Two- and four-wire field devices can be connected to a WirelessHART adapter. In the case of a connected two-wire field device, power can be supplied by the adapter. Where multiple two-wire field devices are connected (multi drop operation), the adapter must be connected to an external power supply.

The WirelessHART adapter may also be connected in parallel to an already existing installation which consists of a power supply and a HART field device.

Interface	Connection	Function
1	—	Power supply for the field device
2	—	HART/4 ... 20 mA
3	—	External supply/Dimensions
4	—	High-resistance HART connection
5, 7	—	High-resistance HART connection
6, 8	—	Mass, high-resistance connection

Terminal block with 6 screw connection clamps

Parameterization

The SITRANS AW200 configured via HART. This can be done using a handheld communicator or even more conveniently with a HART modem and the SIMATIC PDM parameterization software.

Initial start-up of the adapter is usually carried out via SIMATIC PDM and HART modem or a handheld communicator. During initial start-up, the network ID and join key is set up in the adapter, among others. Using these parameters, the adapter is then integrated into an existing WirelessHART network.

Once it is integrated into the network, the adapter and connected HART devices can be conveniently operated via the WirelessHART network or with the onsite HART modem.

Siemens HART field devices for the adapter

HART and 4 to 20mA field devices can be connected to the SITRANS AW200 WirelessHART adapter. Depending on the electrical data of the field devices, they can receive their power supply from the WirelessHART adapter or will require an external power supply. Please find current information about connectivity to field devices from Siemens as FAQ under <http://www.siemens.com/automation/service&support>.

Note:

Siemens will only approve the Siemens HART field devices listed there for the adapter, and will only supply technical support for these devices.

Based on HART specifications, it is generally possible to connect devices that are not listed, however with the following limitations:

- All warranties and liabilities will be excluded.
- No technical support

Supplementary Components

WirelessHART products

SITRANS AW200 - WirelessHART adapter

Technical specifications

Input		Design	
Input	Point-to-Point connection to a HART field device or Point-to-Point connection to a 4 ... 20 mA field device or Up to four HART field devices with external power supply which are integrated using the multidrop method	Weight	0.5 kg without battery, 0.75 kg with battery
Communication	HART communication using multidrop method, 4 ... 20 mA power signal with Point-to-Point connection	Enclosure	
Protocol	HART V7 (compatible with previous HART versions)	• Material	Polyester (PBT FR)
Transfer rate	1200 bits/s using HART multidrop method	• Cable entry	2x M20x1.5
Output		Degree of protection	IP65, IP66; NEMA 4
Communication	WirelessHART V7	Antenna	Omnidirectional dipolar aerial, vertical rotation
Transfer rate	Nominal 250 kBits/s	Mounting adapter	M20 x 1.5 on M20 x 1.5, M20 x 1.5 on G $\frac{1}{2}$, M20 x 1.5 on $\frac{1}{2}$ "- 14 NPT, M20 x 1.5 on $\frac{3}{4}$ " -14 NPT
Transmission frequency band	2.4 GHz (ISM band)	Power supply	
Range (under reference conditions)	Outside areas up to 250 m, within buildings up to 50 m	Battery	Lithium thionylchlorid high-performance battery unit
RF signal strength	Can be configured: 0 dBm and 10 dBm	Supply voltage	5 ... 7.2 V DC
Output signals		Capacity	19 Ah at 20 °C
• WirelessHART adapter	Measured voltage and up to three other variables may be selected from the following: adapter temperature, battery voltage, energy consumed, expected battery life time	Service life	Up to 5 years, depending on update rate, connected field device and ambient conditions
• 4 ... 20 mA field device	Scaled or linearized process values	Voltage supply for one field device (independent of multidrop)	
• HART field device	Up to four process variables, can be configured via PDM or gateway	• No-load voltage	8 ... 23 V DC
Measuring accuracy (as per reference conditions IEC 61298-2)		• Current	4 ... 20 mA DC (as per NAMUR recommendation NE 43)
Max. measuring error (4 ... 20 mA circuit)	0.125 % re: measuring range	• Fault current	I ≤ 3.6 mA or I ≥ 21 mA
Effect of ambient temperature (4 ... 20 mA circuit)	5 μ A/10 K	• Protection	Short-circuit proof, activated at voltages > 25 mA
Rated conditions		External voltage supply for one or more field devices (multidrop)	
Location	Outside/Inside	• Voltage	< 30 V DC
Ambient conditions		• Current	< 25 mA
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F) The capacity of the battery decreases rapidly if ambient temperature falls below -30 °C.	Certificates and approvals	
• Storage temperature	-40 ... +85 °C (-40 ... +185 °F) without batteries < 21 °C with batteries	Wireless communication approvals	ETSI (R&TTE) FCC Part 15.247 for wireless applications in the 2.4 GHz transmission frequency band EN 300328
• Relative humidity	Max 90 % at 25 °C (non-condensating)		
• Resistance to vibration	20 ≤ f ≤ 2000 Hz: 0,01 g ² /Hz as per IEC 68-2-64		
• Shock resistance	15 g, 11 ms as per IEC 68-2-27		
Electromagnetic compatibility	As per EN 61326, EN 301 489-1/17 and NAMUR NE 21		

Selection and ordering data	Article No.
SITRANS AW200 adapter for WirelessHART communication ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7MP3112 - 0 - 0AA0
WirelessHART adapter AW200 with 4 ... 20 mA- or HART interface Without battery	1
Power supply Battery powered	A
Certificates and approvals¹⁾ Without	A
Enclosure Polyester	0
Accessories	
Lithium battery for SITRANS AW200	7MP3990-0AA00
Thread adapter for direct mounting of the adapter to a field device	
• M20 thread adapter	7MP3990-0BA00
• Thread adapter G½	7MP3990-0BB00
• Thread adapter ½" - 14 NPT	7MP3990-0BC00
• Thread adapter ¾" - 14 NPT	7MP3990-0BD00
Mounting bracket for attaching to wall/pipe, material: stainless steel SS304, including cable gland	7MP3990-0CA00

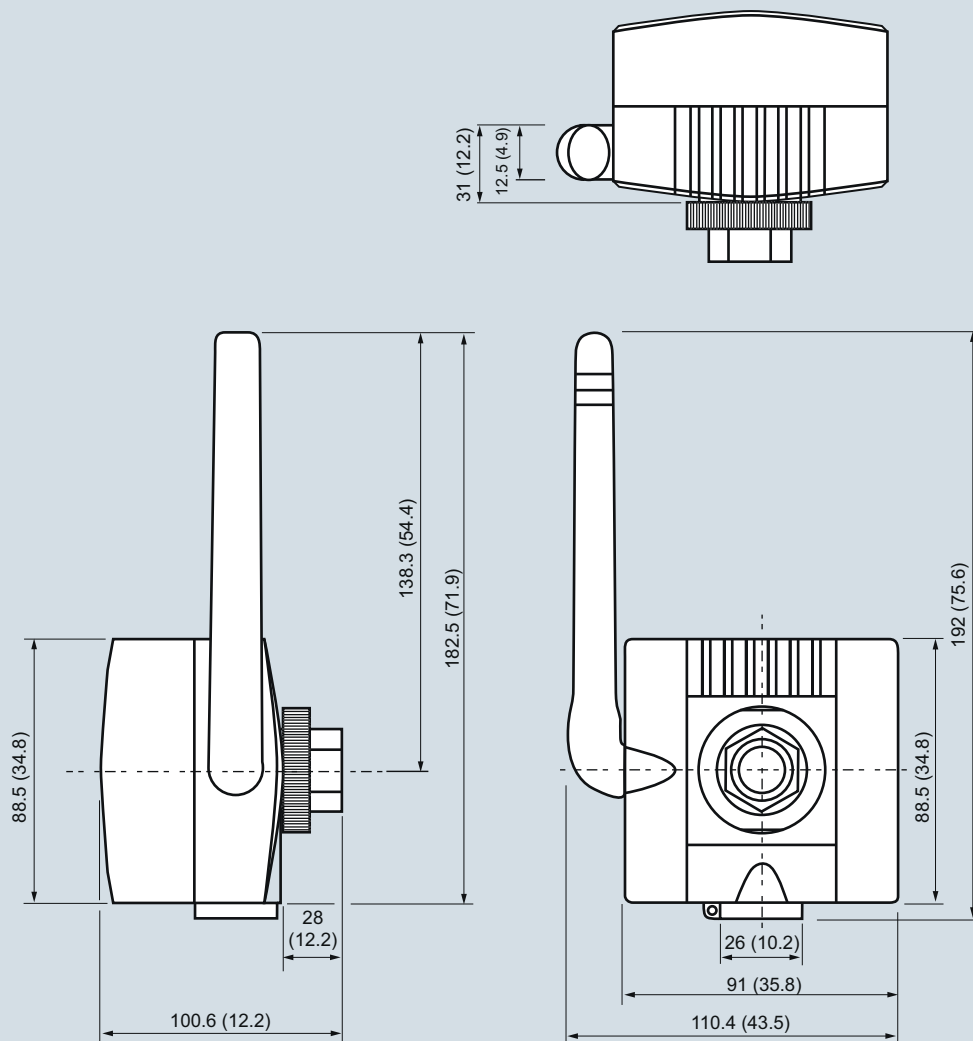
¹⁾ Additional approvals in process.

Supplementary Components

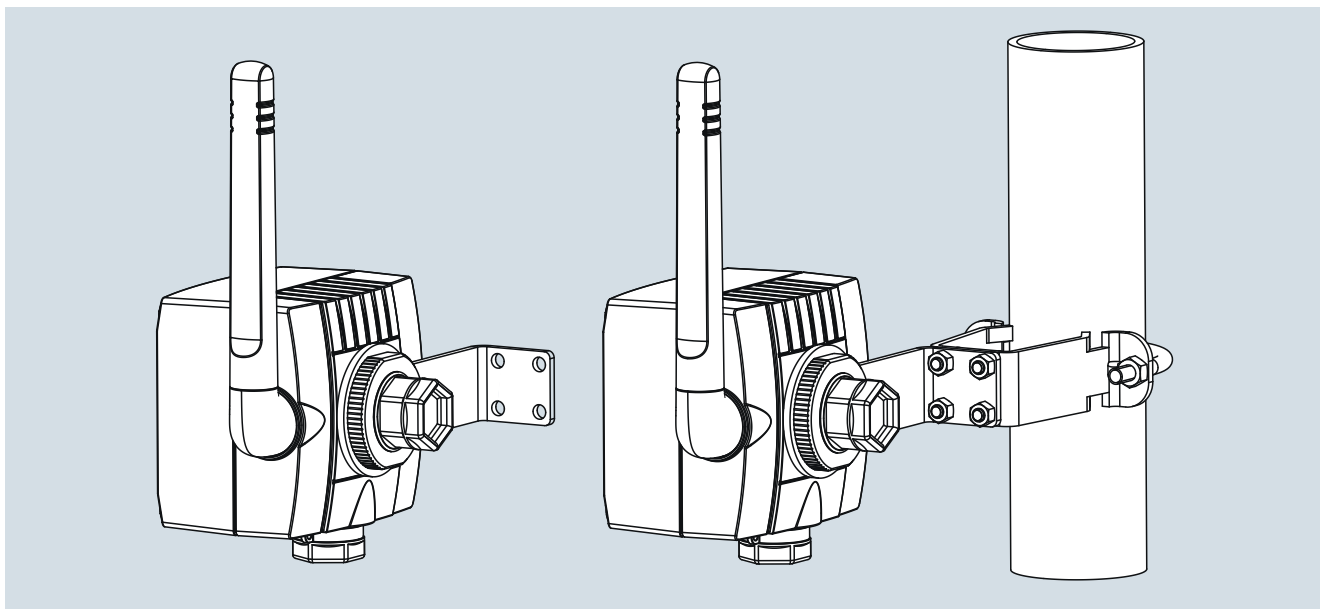
WirelessHART products

SITRANS AW200 - WirelessHART adapter

Dimensional drawings

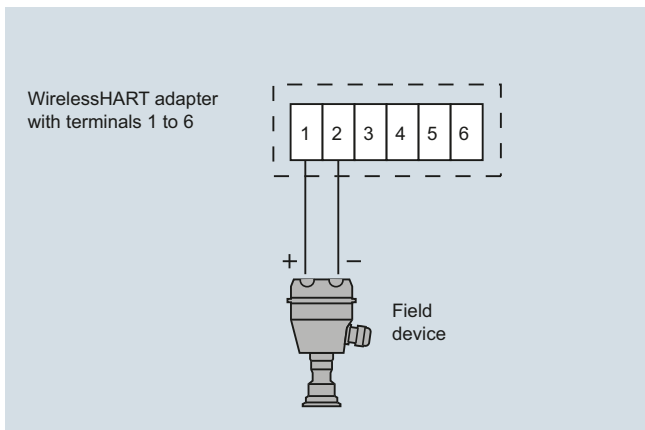


SITRANS AW200 WirelessHART adapter, dimensions in mm (inch)

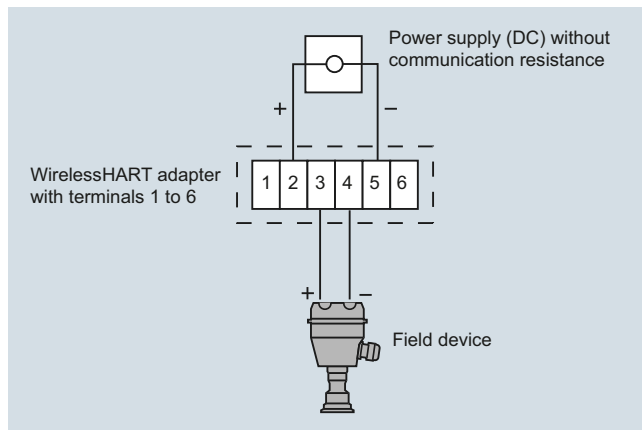


SITRANS AW200 with built-in mounting bracket for wall or pipe mounting

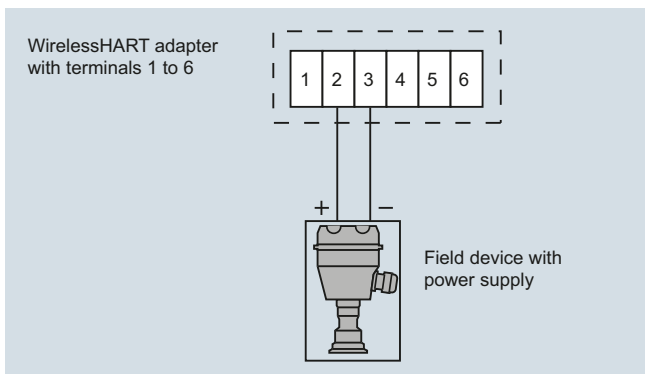
Schematics



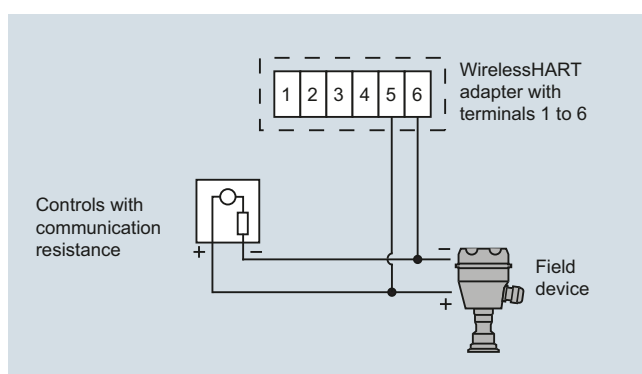
Connection of a two-wire field device, power supply provided by adapter



Connection of a two-wire field device with external power supply



Connection of a four-wire field device



Connection of adapter parallel to wired 4 to 20 mA communication

Supplementary Components

WirelessHART products

SITRANS AW210 - WirelessHART adapter

Overview



SITRANS AW210 WirelessHART adapter

The WirelessHART adapter SITRANS AW210 is a communication component which can integrate a wide range of field devices into a WirelessHART network. On the wireless communication side, the adapter supports the WirelessHART standard. HART and 4 to 20 mA field devices are connected on the field device side.

The WirelessHART adapter SITRANS AW210

- Supports the WirelessHART standard (HART V 7.1)
- Features an extremely high degree of security for wireless data transmission.
- Integrates a 4 to 20 mA field device into a WirelessHART network
- Integrates up to eight HART field devices (in multidrop mode) into a WirelessHART network
- Can be powered with the 4 to 20 mA loop or an external power supply
- Power management can be activated to minimize energy consumption
- Easy to configure with SIMATIC PDM, AMS, Handheld 475.

Benefits

- "Intrinsically safe" or "Explosion proof"
- High quality and service life
- Extremely rugged enclosure
- No additional cabling required with loop power supply
- Subsequent integration of an installed field device with HART interface into maintenance and diagnostic systems if the control system does not feature the required communication mechanisms
- Proven HART devices can continue to be used for wireless communication without any limitations
- Field devices with a 4 to 20 mA interface (without HART) can also be connected
- Ideal addition to wired communication and to the range of system solutions in process automation
- Burst mode and event notification configuration for the adapter and connected field devices

Application

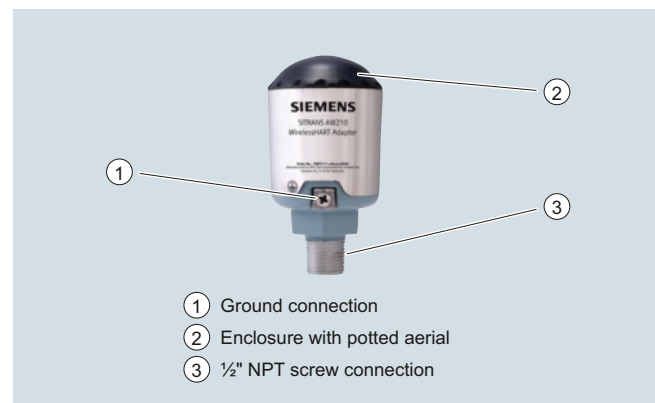
The WirelessHART adapter can be used in a number of different applications:

- Access to installed basis
Diagnostic information is obtained from existing wired HART devices thanks to the permanent electrical connection of a WirelessHART adapter and power from the 4 to 20 mA loop. This information is sent to central system-based asset management software such as SITRANS MDS.
- Status monitoring of the plant
Wireless devices are mounted at critical points in the plant which are not usually connected to the control room due to difficult access or high wiring costs. Better data flow and diagnostics increase plant reliability, transparency and safety.
- Process optimization
Temporary installation of a 4 to 20mA or standard HART device together with a SITRANS AW210 WirelessHART adapter allows easier, flexible monitoring and plant optimization at lower costs. SITRANS AW210 can also be usefully used where there is already an external power supply, or one is needed anyway.
- Process monitoring
Measured values, for example from tanks or silos, are transmitted to a higher-level system at regular intervals together with the device status. SITRANS AW210 is particularly easy to use with 4-wire devices, as they have an external power supply.

Design

SITRANS AW210 WirelessHART Adapter consists of:

- An enclosure with a fitted aerial
- Electronics

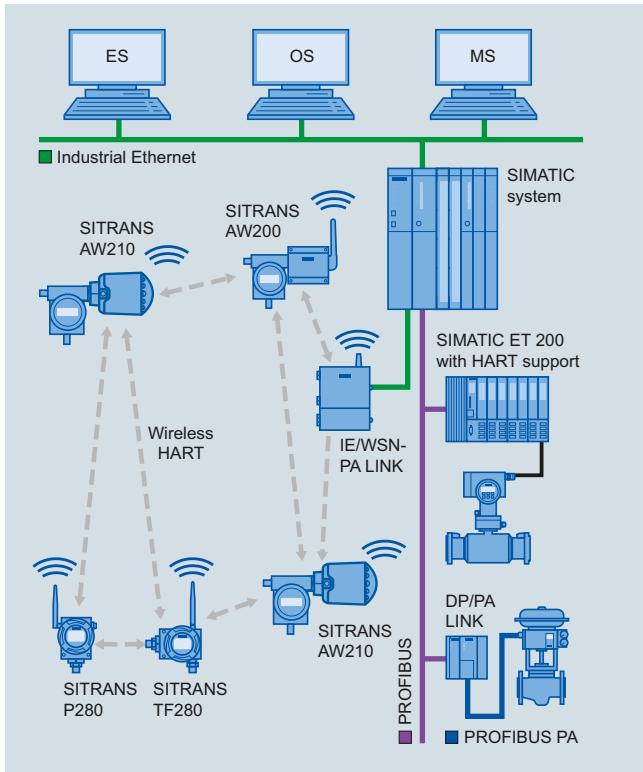


SITRANS AW210 Wireless-HART Adapter, assembly

The enclosure contains the potted electronics and the wireless module. The aerial is fitted at the top in the enclosure.

On the base of the enclosure is the connector with a 1/2" NPT female thread. Six cables run from this connector to connect the adapter.

Function



SITRANS AW210 WirelessHART Adapter, functional diagram

The measured values and diagnostic information from the connected field devices with HART communication are transmitted to the WirelessHART adapter over wired connections. The adapter transmits this information as wireless signals to the IE/WSN-PA link, the Siemens WirelessHART gateway. The measured values, all parameters and diagnostic information about the plant network can be accessed from this gateway.

If a field device with a 4 to 20 mA output signal is connected to the adapter, the current will be converted to a digital measured value and transmitted on the basis of a measuring range specified in SITRANS AW210.

Following configuration and integration into a WirelessHART network, each WirelessHART adapter is able to recognize its neighbors. It notes the strength of the wireless signal, synchronizes itself, receives network information and then establishes connections to its neighbors in the wireless network. A WirelessHART network organizes itself. Manual settings for organization are not required.

Two-wire and four-wire field devices can be connected to a WirelessHART adapter. Either up to 2 or up to 8 HART field devices can be connected to the adapter, depending on the selected product version. The adapter either has an external voltage supply or is loop-powered. The WirelessHART adapter can therefore also be connected in parallel to an existing installation consisting of a voltage supply and a HART field device.

Parameter assignment

SITRANS AW210 is configured via HART. Configuration can be carried out using handheld communicator 475 or, more conveniently, with a HART modem and the SIMATIC PDM configuration software.

Initial startup of the adapter is usually carried out via SIMATIC PDM and a HART modem or a handheld communicator. During initial startup, the network ID and join key are set in the adapter. These parameters are used to integrate the adapter into an existing WirelessHART network.

Following integration into the network, the adapter and HART devices connected can be conveniently operated via the WirelessHART network or locally, as detailed above.

Siemens HART field devices for the adapter

In principle, all HART devices certified by the HART Communication Foundation (HCF) can be operated with the SITRANS AW210 WirelessHART adapter. See <http://www.siemens.com/automation/service&support> for FAQ with the latest information on connectivity for Siemens field devices.

Note:

Siemens has only approved the Siemens HART field devices listed there for the adapter, and will only provide technical support for these devices.

Based on HART specifications, it is generally possible to connect devices that are not listed, however with the following restrictions:

- All warranties and liability will be excluded
- No technical support

Technical specifications

Input

Point-to-point connection to a HART field device or
Point-to-point connection to a 4 ... 20 mA field device or
Up to eight HART field devices with an external voltage supply integrated using multidrop

Communication

- HART communication with multidrop, as primary or secondary HART master (can be specified)
- 4 ... 20 mA current signal with a point-to-point connection scaling in user-defined measuring range in SITRANS AW210
 - Linear
 - User-defined scaling with up to 32 points

Protocol

HART V7 (compatible with previous HART versions)

Supplementary Components

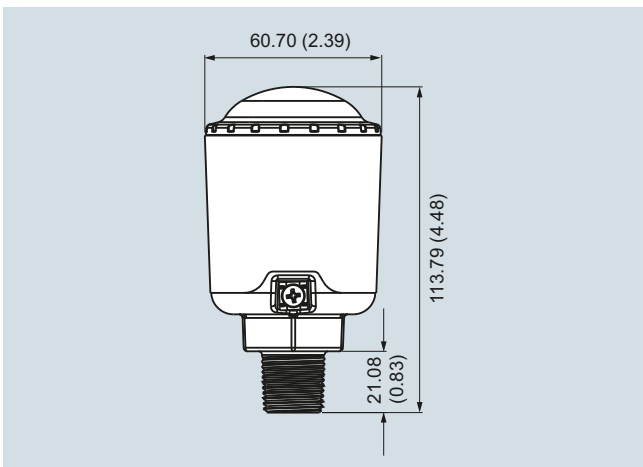
WirelessHART products

SITRANS AW210 - WirelessHART adapter

Output Communication Transmission frequency band Range (under reference conditions) RF signal strength Output signals <ul style="list-style-type: none"> WirelessHART adapter <ul style="list-style-type: none"> 4 ... 20 mA field device HART field device 	WirelessHART V7 2.4 ... 2.4835 GHz (ISM band), 16-channel frequency hopping spread spectrum Outside up to 235 m (771 ft) 10 dBm <ul style="list-style-type: none"> HART Cmd 3 Measured current and up to 4 other dynamic variables (measured values, derived values) or device variables HART Cmd 9 Up to 8 dynamic variables with status HART Cmd 48 Additional status information Scaled or linearized process values <ul style="list-style-type: none"> HART Cmd 3 Measured current and up to 4 other dynamic variables (measured values, derived values) or device variables HART Cmd 9 Up to 8 dynamic variables with status HART Cmd 48 Additional status information 	Certificates and approvals Wireless communication approvals <ul style="list-style-type: none"> CE (R&TTE, EMC) FCC Part 15.247 for wireless applications in the 2.4 GHz transmission frequency band IC 	
Update time for output signals	You can set the update times separately for the adapter and the connected devices. The possible settings are: <ul style="list-style-type: none"> 1, 2, 4, 8, 16, 32 s 1, 2, 5, 10, 30, 60 min (times also depend on the gateway) 	Explosion protection Intrinsic safe "i" gases and vapors Intrinsic safe dust Non-sparking (zone 2) Explosion protection to FM for US Intrinsic safe, Non-sparking Explosion protection to FM for CA Intrinsic safe, Non-sparking	II 1G Ex ia IIC T*; IP68 T* = T5 for Ta = -40 ... +85 °C T* = T6 for Ta = -40 ... +75 °C II 1 D Ex iaD 20 IP68 T95C; Ta = -40 ... +85 °C II 3 G Ex nA nC IIC T* Gc; IP68 T* = T5 for Ta = -40 ... +85 °C T* = T6 for Ta = -40 ... +75 °C IS/I,II,III/1/ABCDEFGH/ T5 Ta = -40 ... +85 °C, T6 Ta = -40 ... +75 °C NI/I/2/ABCD/ T5 Ta = -40 ... +85 °C, T6 Ta = -40 ... +75 °C S/II,III/2/EFG/ T5 Ta = -40 ... +85 °C, T6 Ta = -40 ... +75 °C I/0/AEx ia/IIC/ T5 Ta = -40 ... +85 °C T6 Ta = -40 ... +75 °C; 20/AEx iaD/T95°C; Ta = -40 ... 85°C I/2/AEx nA nC/IIC/ T5 Ta = -40 ... +85 °C, T6 Ta = -40 ... +75 °C; IP68 IS/I,II,III/1/ABCDEFGH/ T5 Ta = -40 ... +85 °C T6 Ta = -40 ... +75 °C; NI/I/2/ABCD/ T5 Ta = -40 ... +85 °C T6 Ta = -40 ... +75 °C; S/II,III/2/EFG/ T5 Ta = -40 ... +85 °C T6 Ta = -40 ... +75 °C; I/0/Ex ia/IIC/ T5 Ta = -40 ... +85 °C T6 Ta = -40 ... +75 °C; I/2/Ex nA nC/IIC/ T5 Ta = -40 ... +85 °C T6 Ta = -40 ... +75 °C II/1/EFG Ta = -40 ... +85°C; IP68
Measuring accuracy Max. measuring error (4 ... 20 mA circuit)	1 % of measuring range, 40 ... 85 °C (104 ... 185 °F)	Flameproof gases and vapors	II 2 G Ex d IIC T* Gb; IP68 T* = T5 for Ta = -40 ... +85 °C T* = T6 for Ta = -40 ... +75 °C
Rated conditions Location Ambient conditions <ul style="list-style-type: none"> Ambient temperature <ul style="list-style-type: none"> Storage temperature Electromagnetic compatibility	Outside/inside -40 ... +85 °C (-40 ... +185 °F) In hazardous areas up to 75 °C (167 °F) -40 ... +85 °C (-40 ... +185 °F) To EN 301 489-17 and EN 300 328-1	Protection by enclosure dust Explosion protection to FM for US Explosionproof, flameproof, gas, dust Explosion protection to FM for CA Explosionproof, flameproof, gas, dust	II/1/EFG Ta = -40 ... +85°C; IP68 II 2 G Ex d IIC T* Gb; IP68 T* = T5 for Ta = -40 ... +85 °C T* = T6 for Ta = -40 ... +75 °C II 2 D Ex tb IIIC T95°C Ta = -40 ... +85°C; IP68 XP/I/1/ABCD I/1 AEx d IIC T5, T6 Gb DIP/II,III/1/EFG 21/AEx tb IIIC T95°C T5 Ta = -40 ... +85°C, T6 Ta = -40 ... +75°C Type 6P, IP68 XP/I/1/ABCD I/1 Ex d IIC T5, T6 Gb DIP/II,III/1/EFG T5 Ta = -40 ... +85°C, T6 Ta = -40 ... +75°C
Design Weight Enclosure <ul style="list-style-type: none"> Material - Enclosure - Cap <ul style="list-style-type: none"> Cable entry Degree of protection Aerial	0.46 kg (1.01 lb) Aluminum alloy, RoHS-compliant polyurethane corrosion-resistant coating Resin ½" NPT female thread IP68 Potted in enclosure		
Auxiliary power Power supply Loop-powered, operating current	Loop power 1 ... DC 2.5 V, can be set by user in 0.5 V DC increments DC 3.2 ... 25 mA operating current; overvoltage, surge and reverse polarity protection		

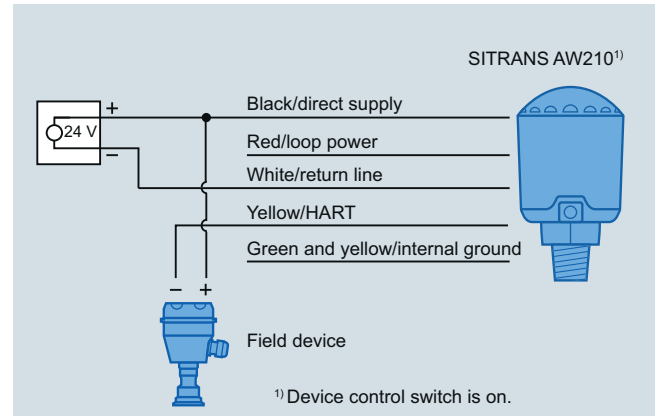
Selection and ordering data	Article No.
SITRANS AW210 Adapter for WirelessHART communication	7MP3111 - 0 - 0AA0
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	
WirelessHART-Adapter AW210 with 4 ... 20 mA- or HART interface	
2 devices	1
8 devices	2
Auxiliary Power	A
Loop powered or 24 V DC (external)	
Certificates and approvals	B
Intrinsically safe gas, vapors and dust (ATEX) , Intrinsic Safe (FM)	
Explosionproof gas, vapour and dust (ATEX), Explosionproof (FM)	C
Enclosure	0
Aluminum	
Accessories	
Thread adapter M20x1.5 (male thread) on ½-14 NPT (female thread) IP65, not explosion proof	7MP1990-0BA00

Dimensional drawings

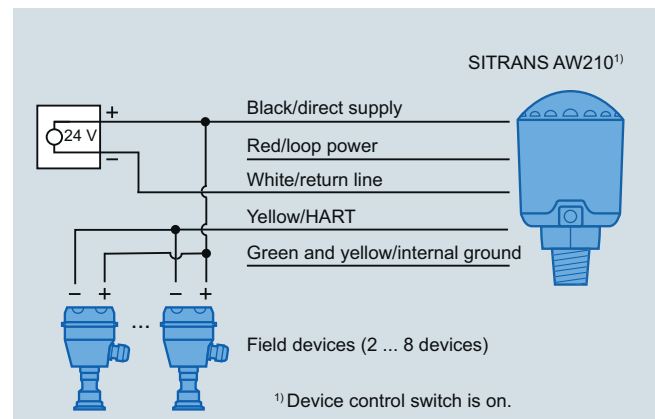


SITRANS AW210 WirelessHART adapter, dimensions in mm (inches)

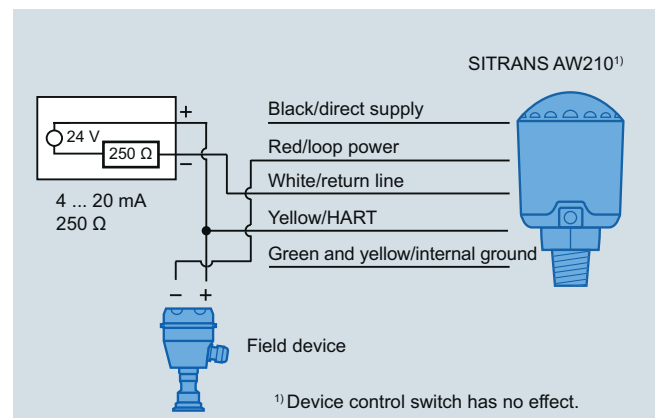
Schematics



External 24 V DC power supply, connection of one device



External 24 V DC power supply, connection of multiple devices



Loop power for connection of one 4 ... 20 mA HART device

Supplementary Components

WirelessHART products

IE/WSN-PA LINK

Overview



- The IE/WSN-PA LINK is a network transition for the connection of WirelessHART field devices (HART V7.1) to Industrial Ethernet, as an alternative or supplement to the wired connection.
- Connection of up to 100 WirelessHART devices
- Approved for operation in hazardous areas in Zone 2
- Open TCP/IP communication and Modbus TCP via the Ethernet interface
- Can be used with HART-OPC servers of the HART Communication Foundation

Note:

A general introduction to WirelessHART and information on the WirelessHART adapter and the WirelessHART field devices can be found in Catalog FI 01 or on the Internet at <http://www.siemens.com/wirelesshart>

Benefits

- Extended possible solutions for connecting process industry field devices by means of alternative or supplementary WirelessHART communication
- Reliable data transmission using intermeshed network technology; the self-organizing network with alternative paths enables radio obstacles to be bypassed
- Reduction of cabling costs under difficult installation conditions, e.g. if the field devices are located on inaccessible plant components or are only required temporarily
- To improve process monitoring and for maintenance tasks, sensors can be retrofitted
- Existing transmitters can be integrated wirelessly into maintenance and diagnostics systems by means of WirelessHART adapters
- Without additional software, restricted monitoring is possible via web services and the integrated web server of the IE/WSN-PA LINK.

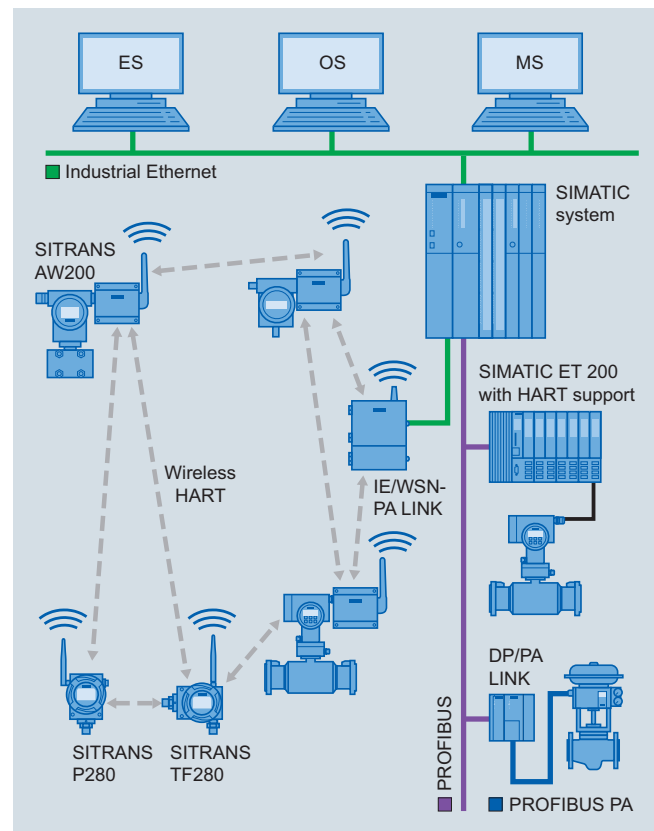
Application

The IE/WSN-PA LINK connects wireless HART field devices by radio to the Ethernet. On the radio side, the IE/WSN-PA LINK supports the WirelessHART standard and on the Ethernet side the TCP/IP and Modbus TCP communication.

The IE/WSN-PA LINK thus enables wireless diagnostics, maintenance and process monitoring.

Monitoring

WirelessHART is particularly suitable for use in plant sections that are to be included in monitoring, but which do not have any existing MSR cabling, e.g. external tank stores or other installations where high cabling costs are anticipated. Data for the visualization can be retrieved from the IE/WSN-PA link via Industrial Ethernet or Modbus TCP.



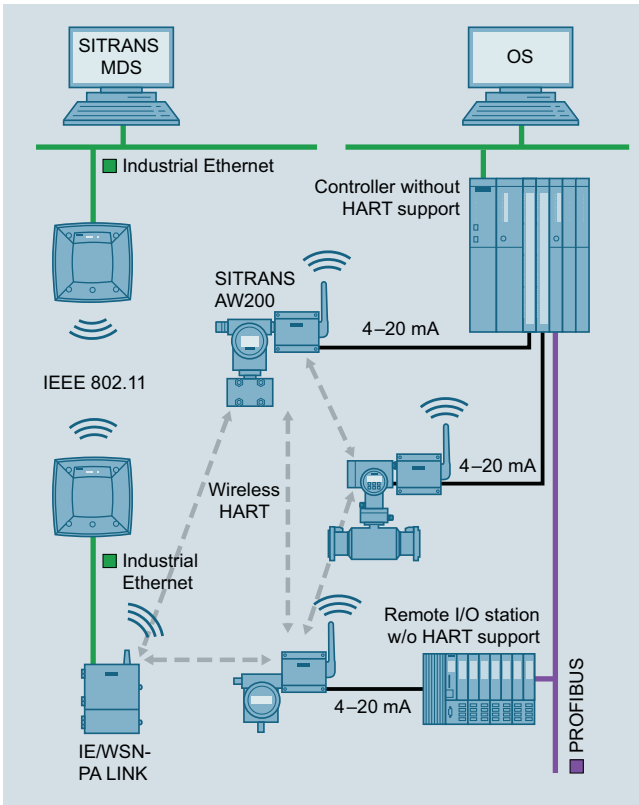
Monitoring of process states via WirelessHART

Retrofitting for diagnostics and maintenance

For this application, wireless adapters are looped into the 4-20 mA interface or screwed directly onto the HART device. The acyclic HART message frames are transmitted by radio between IE/WSN-PA LINK and a wireless adapter. Without affecting the operation of the plant, the wireless adapter modulates the acyclic HART message frames to the 4-20 mA interface or extracts them from the 4-20 mA interface.

The IE/WSN-PA LINK collects the data of all wireless adapters and transfers it via Industrial Ethernet to the diagnostics and maintenance station.

If greater distances between the IE/WSN-PA LINK and the monitoring station are to be spanned without cabling, this can be implemented by means of Industrial Wireless LAN with the access points and client modules of the SCALANCE W family.



Retrofitting of plants for diagnostics and maintenance

Design

- 2 x 10/100/1 000 Mbit/s RJ45 ports, electrical (no integral switch; interfaces can be used, for example, for continuous connection to the plant network as well as the temporary connection of a PC)
- 1 x screw terminal for connection to Modbus RTU via RS 485
- 1 x screw terminal for the 24 V DC connection
- Rugged metal enclosure with IP65 protection for use outdoors, also in hazardous zone 2
- Mounting: wall or mast mounting (vertical); U-bolts for mast mounting are included in the scope of delivery.

Product versions

- With integral, non-detachable antenna
- Redundancy function and with N connector for connection of an external antenna

Function

WirelessHART

The IE/WSN-PA LINK establishes on the radio side an inter-meshed wireless sensor network for communication with wireless field devices (e.g. transmitters). The data from the wireless field devices is received by the IE/WSN-PA LINK and transmitted via Industrial Ethernet to the connected systems. The supported wireless network is an open wireless network specified by the HART Communication Foundation (HCF) in accordance with the WirelessHART (HART V7.1) standard.

On the field device side, the IE/WSN-PA LINK requires field devices that support WirelessHART (HART). Existing field devices can be integrated by means of wireless adapters into the WirelessHART communication. To this end, the adapters are looped into the 4-20 mA interface. In addition, as many as four standard HART field devices with external power supply can be connected to the adapter in multidrop mode. Individually connected devices can be operated with the battery of the adapter.

The adapter wirelessly transmits all data and process values of the connected devices. The advantage of this solution is that tried and tested devices can continue to be used.

Industrial Ethernet

Via the Ethernet interface the IE/WSN-PA LINK supports the use of the HART OPC server and the Modbus TCP protocol.

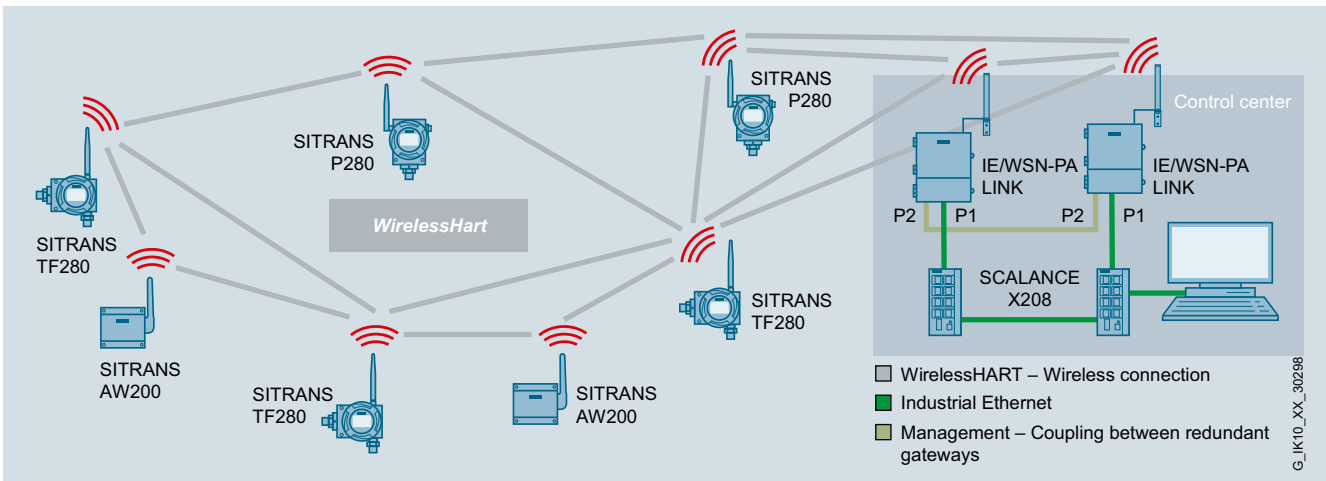
Configuration

The configuration is web-based, without additional software, and performed from the PC. By means of the web user interface it is also possible to display the device states and measured values of the WirelessHART devices.

Increased availability of WirelessHART application due to redundancy mode

For increased availability requirements, the link can be used redundantly. The redundancy function is only available for the device variant with a connection for an external antenna.

Two links are connected to the same Ethernet subnet via a switch to provide the redundancy. The two links are connected to each other via an Ethernet cable (management coupling). One of the two links is configured as the active device. It carries out the communication between the control center and the WirelessHART wireless network under normal conditions. The second link is configured identically. It is used as a standby device. In a redundancy scenario, the standby device becomes the active device.



WirelessHART network operated with a redundant gateway

Supplementary Components

WirelessHART products

IE/WSN-PA LINK

Integration

Integration into automation systems

The IE/WSN-PA LINK can be integrated into automation systems via Ethernet or Modbus TCP. Communication modules (CP 343-1 or CP 443-1) are required to connect the IE/WSN-PA LINK to SIMATIC S7-300/400. Function blocks and technical support can be found at:

www.siemens.com/simatic-net/ik-info

Integration in PCS 7

For integration of the IE/WSN-PA LINK into PCS 7 you can obtain function blocks and technical support at:

www.siemens.com/simatic-net/ik-info

Technical specifications

Article No.	6GK1411-6CA40-0AA0	6GK1411-6CA40-0BA0
Product type designation	IE/WSN-PA LINK	IE/WSN-PA LINK
Transfer rate		
• at the interface 1	10 ... 100 Mbit/s	
• at the interface 2	10 ... 100 Mbit/s	
• at the interface 3	9.6 to 57.6 kbit/s	
Interfaces		
Number of electrical connections		
• at interface 1 in accordance with Industrial Ethernet	1	
• at interface 2 in accordance with Industrial Ethernet	1	
• at interface 3 in accordance with RS 485	1	
• For power supply	1	
Design of electrical connection		
• at interface 1 in accordance with Industrial Ethernet	RJ 45 port	
• at interface 2 in accordance with Industrial Ethernet	RJ 45 port	
• at interface 3 in accordance with RS 485	2-pin terminal strip	
• For power supply	3-pin terminal strip	
Interfaces wireless		
Number of radio cards permanently installed	1	1
Number of internal antennas	1	0
Number of electrical connections for external antenna(s)	0	1
Design of electrical connection for external antenna(s)	-	N-Connector
Supply voltage, current consumption, power loss		
Type of power supply	DC	
Supply voltage, external	24 V	
• Minimum	20 V	
• Maximum	28 V	
Current consumed from external power supply at 24 V DC, maximum	0.5 A	
Active power loss, maximum	12 W	
Permitted ambient conditions		
Ambient temperature		
• During operating	-40 ... +70 °C	
• During storage	-40 ... +85 °C	
• During transport	-40 ... +85 °C	
Relative humidity at 25 °C without condensation during operating phase, maximum	90 %	
Protection class IP	IP 65	
Design, dimensions and weights		
Width of the housing	229 mm	
Height of the enclosure		
• Without antenna	306 mm	
• With antenna	354 mm	
Depth of the housing	89 mm	
Net weight	4.54 kg	
Mounting type		
• Wall mounting	Yes	
• Mast mounting	Yes	
Mounting type	Material for mast mounting included in scope of delivery	

Wireless frequencies Radio frequency with WirelessHART in the 2.4 GHz frequency band • Initial value • End value		2.4 GHz 2.5 GHz		
Performance data WirelessHART Number of WirelessHART devices which can be operated Network latency • For 100 field devices and WirelessHART network maximum • For 50 field devices and WirelessHART network maximum Transmission link between two devices with WirelessHART network • Maximum • Note Protocol is supported HART		100 10 s 5 s 100 m Values may vary in the case of radio obstacles Yes		
Product properties, functions, components general Protocol is supported • Address Resolution Protocol (ARP) • HTTP • HTTPS • Modbus TCP • Modbus TCP secure • Modbus RTU		Yes Yes Yes Yes Yes Yes		
Product functions management, configuration Product function • Web-based management • DHCP client		Yes Yes		
Product functions Diagnosis Product function • Web-based diagnostics • WirelessHART diagnostics via Modbus		Yes Yes		
Product functions Redundancy Product function device redundancy		No Yes		
Product functions Security Product function • Password protection - multilevel • WirelessHART join key • ACL - MAC-based • WirelessHART network ID Protocol is supported SSL Principle of encryption		Yes Yes Yes Yes Yes AES 128 bit		
Product functions Time Protocol is supported NTP		Yes		
Standards, specifications, approvals Standard for WirelessHART Standard for wireless communication IEEE 802.15.4 Certificate of suitability • CE mark • Concerning CSA • Concerning FM • Concerning ATEX • Regarding IECEx Regarding NEMA Wireless approval		HART V 7.1 Yes Yes CSA Division 2 & Dust Ignition-proof for Class I, Division 2, Groups A, B, C, and D. Dust Ignition-proof for Class II, Groups E, F, and G / Suitable for Class III Hazardous Locations. / Install per Siemens drawing A5E02467236A. Temperature Code: T4 (-40°C < Ta < 60°C) CSA Enclosure Type 4X FM Division 2, Non-Incendive for Class I, Division 2, Groups A, B, C, and D. Dust Ignition-proof for Class II, III, Division 1, Groups E, F, and G / Indoor and outdoor locations / NEMA Type 4X Temperature Code: T4 (-40°C < Ta < 60°C) ATEX type n, see note: Certificate number: Baseefa10ATEX0044X, ATEX marking: Ex II 3 G, Ex nA nL IIC T4 (-40 °C <= Ta <= 60 °C), rated voltage: 28 V, ATEX Dust Ignition-proof: Certificate number: Baseefa10ATEX0045X, ATEX marking: II 3 D, Ex tD A22 IP66 T135 (-40 °C <= Ta <= 60 °C), rated voltage: 28 V. Note on type n: Conditions for safe handling during installation: The device does not pass the 500 V insulation test in accordance with paragraph 6.8.1 of EN 60079-15:2005. This must be taken into account when installing the device. IECEx type n, see note: Certificate number: IECEx BAS 10.0014X, Ex nA nL IIC T4 (-40 °C <= Ta <= 60 °C), rated voltage: 28 V, IECEx Dust Ignition-proof, see note: Certificate number: IECEx BAS 10.0015X, Ex tD A22 IP66 T135 (-40 °C <= Ta <= 60 °C), rated voltage: 28 V. Note on type n: Conditions for safe handling during installation: The device does not pass the 500 V insulation test in accordance with paragraph 6.8.1 of EN 60079-15:2005. This must be taken into account when installing the device. - FCC and IC approval IC approval		

Supplementary Components

IE/WSN-PA LINK

Selection and Ordering data

	Article No.		Article No.
IE/WSN-PA LINK Gateway between WirelessHART and Industrial Ethernet; transmission frequency: 2.4 GHz <ul style="list-style-type: none"> • With integral, non-detachable antenna • N connector for connection of external antennas 	6GK1411-6CA40-0AA0 6GK1411-6CA40-0BA0	IE FC Stripping Tool Preadjusted stripping tool for fast stripping of the Industrial Ethernet FC cables	6GK1901-1GA00
Antennas Antennas with omni-directional characteristics; country permits, compact instructions (hard copy), German/English Wall or mast-mounting <ul style="list-style-type: none"> • Antenna ANT792-6MN Antenna gain including N-Connect connector 6 dBi, 2.4 GHz Roof mounting <ul style="list-style-type: none"> • ANT795-6MN antenna Antenna gain incl. N-Connect connector 6/8 dBi, 2.4/5 GHz • Antenna mounting tool (ANT795-6MN) Mounting tool for installation of ANT795-6MN under a roof 	6GK5792-6MN00-0AA6 6GK5795-6MN00-0AA6 6GK5795-6MN01-0AA6	Network components for IWLAN HARTING adapter cable ¹⁾ M12 female NPT 1/2 thread to RJ45 11cm, (minimum order quantity: 10); The adapter is provided for easy connection of the link to the Industrial Ethernet;	see "Industrial Wireless Communication" 21036836420 Not included in the scope of delivery of the IE/WSN-PA link; You can find ordering information on the Internet at: http://www.harting.com
LP798-1N Lightning Protector Lightning protector with N/N female/female connector, IP65 (-40 ... +100 °C)	6GK5798-2LP00-2AA6	SITOP compact 24 V/ 0.6 A 1-phase power supply with wide-range input 85 – 264 V AC/110 – 300 V DC, stabilized output voltage 24 V, rated output current value 0.6 A, slim design	6EP1331-5BA00
Antenna cables IWLAN N-Connect male/male flexible connection cable Flexible connecting cable for connecting an external antenna; assembled with two N-Connect male connectors <ul style="list-style-type: none"> • 1 m • 2 m • 5 m • 10 m 	6XV1875-5AH10 6XV1875-5AH20 6XV1875-5AH50 6XV1875-5AN10	¹⁾ When using the Harting adapter cable for the Ethernet connection, the requirements for intrinsic safety approval are not applicable. When used in an application relevant to intrinsic safety guidelines, it requires acceptance by the appropriate approval agency.	
HF coupling N-Connect male/male connector for connecting the LP798-1N lightning protector	6GK5798-0CP00-1AA0	More information Current approvals can be found on the Internet at: http://support.automation.siemens.com/WW/view/en/46374734	
Accessories IE FC M12 Plug PRO M12 plug-in connector suitable for on-site assembly (D-coded, IP65/IP67), metal housing, Fast-Connect connection system, for connecting HARTING adapter cables to the Industrial Ethernet <ul style="list-style-type: none"> • 1 unit 	6GK1901-0DB20-6AA0		
IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order quantity 20 m	6XV1840-2AH10		

Communication and Software



Communication

- 8/2 HART protocol
- 8/3 WirelessHART
- 8/6 PROFIBUS
- 8/7 FOUNDATION Fieldbus

WirelessHART Communication

- 8/8 Communication blocks
- 8/9 SITRANS MDS -
Maintenance Diagnostic Station

Software

- 8/11 SIMATIC PDM -
Process Device Manager
- 8/21 SITRANS DTM
- 8/22 SITRANS Library

Communication and Software

Communication

HART protocol

Overview

HART is a widely used communication standard for field devices. Specification of HART devices takes place through the HCF (HART Communication Foundation).

The HART standard expands the analog 4 to 20 mA signal for modulated, industry-proven, digital signal transmission.

Benefits

- Service-proven analog measured value transmission
- Simultaneous digital communication with bidirectional data transmission
- Possibility of transmitting several measured variables from one field device (e.g. diagnosis, maintenance and process data)
- Connection to higher-level systems such as PROFIBUS DP
- Easy installation and startup

Use in conjunction with SIMATIC PDM

- Cross-vendor operation of all HART devices by means of standardized parameter records
- HART field devices that are described by HART DD are integrated in SIMATIC PDM through the HCF catalog. HART DD (Device Description) is standardized in SIMATIC PDM, multi-vendor and very widely used. Other HART field devices are integrated in SIMATIC PDM through EDD (Electronic Device Description)
- Easy operation and startup of field devices, also in hard-to-reach locations
- Expanded diagnosis, evaluation and logging functions

Application

These devices can be connected in different ways:

- Using the distributed I/O system
 - SIMATIC ET 200M with the HART modules
 - SIMATIC ET 200iSP with the HART modules or with analog modules 4 to 20 mA and a HART handheld communicator
- Using a HART modem, with which a point-to-point connection is established between the PC or engineering station and the HART device
- Using HART multiplexers, which are contained in the HART server of the HCF

Integration

Siemens field devices for process automation which are listed in this catalog and can be controlled using HART:

Measuring instruments for pressure

SITRANS P DS III
SITRANS P300
SITRANS P500

Measuring instruments for temperature

SITRANS TF
SITRANS TH300
SITRANS TR300
SITRANS TW

Flowmeters

SITRANS F M MAG 5000
SITRANS F M MAG 6000 19" / IP67
SITRANS F M MAG 6000 I / I Ex
SITRANS F M Transmag 2
SITRANS F C MASS 6000 19" / IP67 / Ex d
SITRANS F C FCT030
SITRANS FUS060
SITRANS FX300

Measuring instruments for level

Pointek CLS500
SITRANS Probe LR
SITRANS Probe LU
SITRANS LUT400
SITRANS LR200
SITRANS LR250
SITRANS LR260
SITRANS LR400
SITRANS LR460
SITRANS LR560
SITRANS LC500

Positioners

SIPART PS2

Power supply units and isolation amplifiers

SITRANS I

Selection and Ordering data

Article No.

HART modem

With USB connection ▶

7MF4997-1DB

▶ Available ex stock

Overview

WirelessHART is the first international industry standard for wireless communication at field level in the area of process automation. Hence this is the first time users are provided with a standard for wireless communication at field level which ensures the interoperability of instruments and components from different manufacturers.

Benefits

WirelessHART enables access to the following:

- Measuring and control values
- Parameters

of field devices with HART interface. These usually include pressure, temperature, level or flow transmitters or actuators.

WirelessHART allows for the following:

- wireless transmission of measured values and their status
- wireless parameterization and diagnosis of field devices

The WirelessHART adapter can be used to enable field devices with HART interfaces (that are designed for wired communication) for wireless communication. This allows users to continue using their proven devices while benefiting from and participate in addition in advantages offered by wireless communication.

Application

Looking at the large number of possible applications and configurations, we generally differentiate between two application types.

Background for the first type is the fact that according to estimates forwarded by the HART Communication Foundation (HCF), approximately 85 % of the over 30 million HART devices in operation are used in an environment where only the 4 to 20 mA interface rather than the HART interface of the device is used on a system level. Generally, data on the device can only be read on site. This is of particular disadvantage with devices that contain self-diagnostic functions - that's what we call "stranded diagnosis".

In these cases, a WirelessHART adapter can offer assistance. Connected to the 4 to 20 mA loop, it allows central access to the device based on wireless communication. It does not affect process control systems which continue to receive the measured value using the 4 to 20 mA loop.

Central access is enabled through a diagnostic station with SIMATIC PDM and SITRANS MDS software.

Main advantages:

- Increases the availability of the plant
- Increases plant transparency
- Reduces costs due to employing a predictive rather than preventative maintenance concept
- Reduces travel time in larger systems based on central access to field instrumentation

In the second application the 4 to 20 mA loop is omitted, all data including measured process values and diagnostic information are transmitted wirelessly to a process control system, for example.

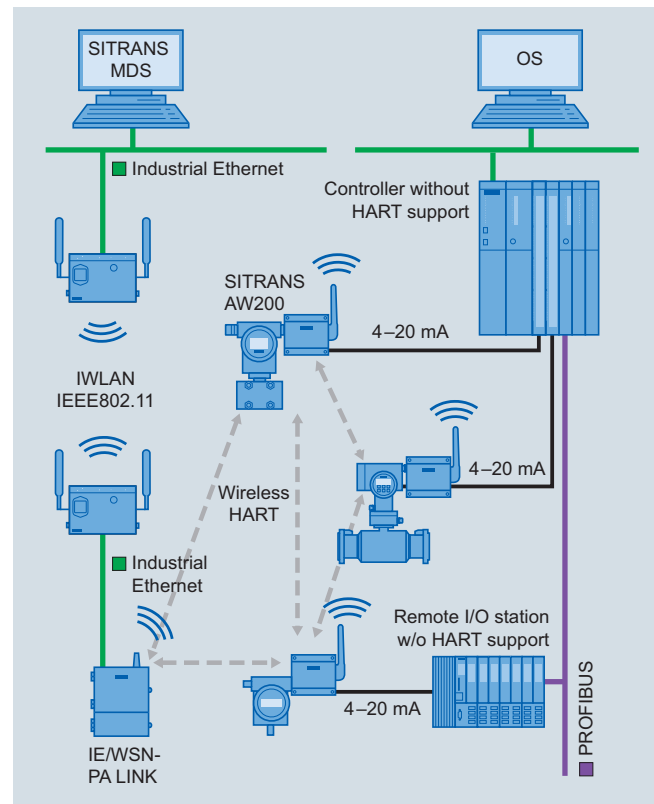
Main advantages are:

- No planning and installation of data cables, resulting in significant cost reductions
- Higher system transparency due to additional and hitherto unfeasible installation of measuring points
- Process optimization due to flexible, temporary and cost-effective measuring points via wireless communication
- Utilization of proven devices by using adapters
- The WirelessHART meshed network also makes it possible to bridge longer distances

Design

This section introduces the application types described in the previous section in greater detail.

The figure below shows a typical situation for the first application type.



The adapter is connected to the 4 to 20 mA loop, which is used to transmit the measured value to the control system, or transmit the setpoint to an actuator. The existing control system is not affected by the WirelessHART adapter.

The data, in particular diagnostic data from the devices is transmitted to the IE/WSN-PA LINK via the connected adapter and the WirelessHART network. The link provides this data to a diagnostic and maintenance station with installed SITRANS MDS software and SIMATIC PDM via an industrial Ethernet. Industrial wireless LAN can be used to save on the installation costs required for Ethernet wiring. An extensive product portfolio of Scalance W components is available for this purpose.

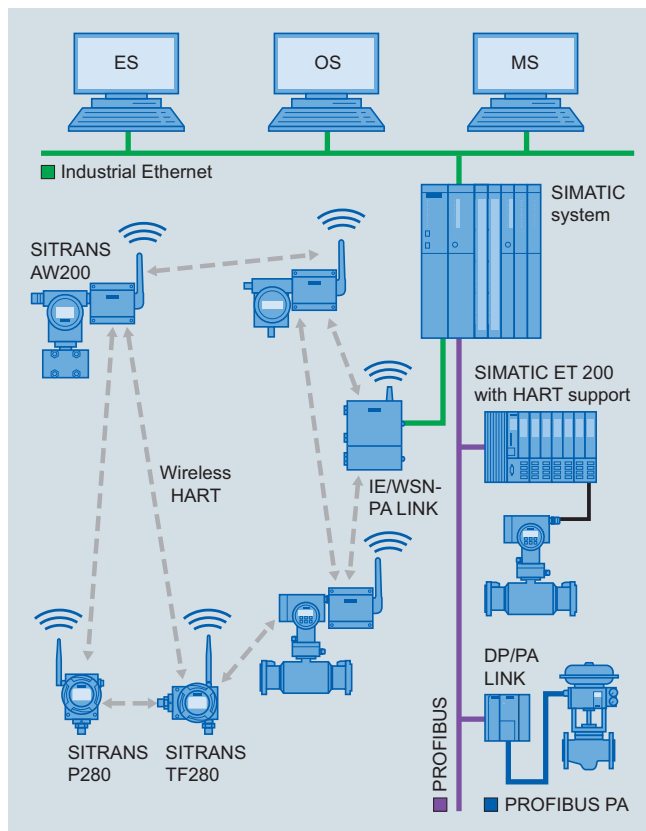
The functionality of related to the SITRANS MDS is described in great detail on page 8/9 of this catalog.

Communication and Software

Communication

WirelessHART

The figure below shows a typical situation for the second application type.



WirelessHART is integrated into SIMATIC systems parallel to the wire-connected devices with HART or PROFIBUS interfaces. In this case, the 4 to 20 mA line to the control system is not required: all data, i.e. process values, parameters, diagnostic information and functions, is supplied to the automation system on a wireless basis. This is mainly useful for replacement and expansion measures related to existing systems, and of course also new systems, but also for temporary and mobile measurements.

The field devices are standard instruments with connected adapters, or those with integrated wireless communication.

In principle, a differentiation needs to be made between wireless communication and the power supply for the devices.

When installing a field device, the planning and installation of the data cable to the control system is usually considered a significant cost driver. This factor is greatly reduced when using wireless communication.

When using 4 to 20 mA/HART field devices with adapters, the question of powering up always arises - in contrast to battery-powered field devices with integrated wireless modules.

It is important to distinguish between two and four-wire devices here. Under certain circumstances, the SITRANS AW200 adapter can take over the supply of a connected two-wire device. The power consumption of the field device plays an important role here. If it is too high, an additional power supply becomes necessary. If more than one device is connected to the SITRANS AW200 adapter, an additional power supply is required.

Four-wire devices always require an additional power supply.

Function

The properties of WirelessHART can be summarized as follows:

- Simplicity in handling and engineering
- Secure communication
- Availability in network

Simplicity in handling and engineering

- Utilize current tools, same workflow
The description of devices and adapter is carried out using proven EDDL technology. SIMATIC PDM continues to be used as a tool.
- Multiple power supply options
Devices can be operated externally with 24 V DC, external or integrated battery packs as well as solar cells. The option of using energy from the process or the environment has been researched at universities and industry for some time. It is expected that results and products will be available in the medium term.
- Reduced installation costs
Depending on use, installation costs for data cables or power supply cables are not required.
- Coexists with other wireless networks
WirelessHART only uses the ISM band in the 2.4 GHz area, since it is available across the globe. However, it is also used by Industrial Wireless LAN (IWLAN), for example. For this reason, a requirement to allow WirelessHART to co-exist with Wireless LAN networks was an absolute requirement when this technology was defined. This coexistence has been achieved by constantly changing the channels and hence frequencies. This is also called "channel hopping". Moreover, individual channels can be completely disabled through so-called "blacklisting", for example if they are locally used by IWLAN.
- Support of star-shaped and meshed network topologies
Networks can be built in both a star-shaped as well as meshed structure. The advantage of star-shaped networks with a gateway as the centre is that it allows for fast update cycles. However, the range of the network is limited to a maximum of approx. 200 m without obstacles between the gateway and the devices.
The advantage of meshed networks is their greater range, since each participant in the network is also a repeater and forwards the data of remote participants towards the gateway. The disadvantage: increased transmission times for data between the field device and the gateway.
- Faster commissioning
Once the device is installed, it can usually be commissioned right away, since the usual waiting time for completing the installation of the cables does not apply in this case.
- Self-organizing and self-healing networks
WirelessHART networks are automatically organized, built and administered by the Network Manager. Engineering is usually not required.
The Network Manager is implemented in the IE/WSN-PA LINK, the WirelessHART gateway from Siemens.
It calculates the optimal connection routes between the network participants and defines an alternative path that can be used in the case of disruptions in advance. In that sense, the network can be considered self-healing.
In addition, the Network manager also defines the channels or frequencies to be used for all communication. Statistics regarding communication are compiled automatically and are available to users.
- Security - always active
All designated mechanisms with regard to security are available automatically, and do not require any engineering.
- Make changes in the network without the need for configuration. The Network Manager automatically adds and withdraws participants to/from the network.

Secure communication

- Encryption - All information is automatically encrypted with 128 bit AES prior to transmission
- Specific keys for each data packet
- Data integrity - Each data packet is checked for changes or damage during transport.
- Device authentication
Each device must know the network identification number as well as the join key. Otherwise the Network Manager does not include it in the network.
- Channel Hopping
The channel which is used will be changed according to the Network manager's specifications after each telegram. This provides an added level of security against spying activities.
- Failed authentication report
Each unsuccessful attempt by a participant to join the network will be recorded and made available to the user.

Availability in network

- Communication based on IEEE 802.15.4-2006
Wireless communication takes place on the basis of a proven industry standard. It allows for very minimal power consumption.
- Utilization of ISM band (2.4 GHz)
This band can be used worldwide without incurring additional costs.
- Channel hopping overcomes disruptions
Disruptions are usually limited to a small frequency range. By constantly changing the channel, it is possible to overcome the effects of such disruptions and hence increase the network's reliability.
- Channel Black Listing permanently blocks disrupted channels.
When operating another network at the same location, the channels occupied by that network can be blocked in the WirelessHART network.
- Self-healing network
This aspect has already been discussed
- Redundant communication paths
The Network manager automatically calculates redundant communication paths. This significantly increases the level of availability.

Software Overview

Applications 1 and 2 will require the following software products

	Component	Products	Article No.
Application type 1	Maintenance Diagnostic Station	SITRANS MDS	1)
		<u>SIMATIC PDM and Options</u>	
		SIMATIC PDM Basic (4 Tags)	6ES7658-3AX16-0YA5
		Extend Basic to 128 Tags	6ES7658-3XA16-2YB5
		Extend Basic to up to 512 Tags	6ES7658-3XB16-2YB5
		Extend Basic to up to 1 024 Tags	6ES7658-3XC16-2YB5
		Extend Basic to up to 2 048 Tags	6ES7658-3XD16-2YB5
		SIMATIC PDM service (128 Tags)	6ES7658-3JX16-0YA5
SIMATIC PDM Option HART Mux	6ES7658-3EX16-2YB5		
	HART OPC Server V3.2	Included in SIMATIC PDM ¹⁾	
	WirelessHART gateway	IE/WSN-PA LINK with integrated non-removable antenna	6GK1411-6CA40-0AA0
	WirelessHART adapter	SITRANS AW200 ²⁾	7MP3112-1AA00-0AA0
Application type 2	Process control system	SIMATIC PCS 7	
		SIMATIC S7/SIMATIC PCS 7 function blocks for communicating with WirelessHART devices using the IE/WSN-PA LINK	9AE4110-3AA00
	WirelessHART gateway	IE/WSN-PA LINK with integrated non-removable aerial ²⁾	6GK1411-6CA40-0AA0
	Field devices	SITRANS AW200 ²⁾	7MP3112-1AA00-0AA0
		SITRANS AW210 ²⁾	7MP3111-...
		SITRANS P280 ²⁾	7MP1120-...
	SITRANS TF280 ²⁾	7MP1110-...	

¹⁾ You can also contact your Siemens contact person.

²⁾ Other versions and accessories can be found in the product descriptions of this catalog.

More information

More detailed information on the required WirelessHART software and hardware components can be found in the FI 01 catalog or at www.siemens.com/wirelesshart.

Communication and Software

Communication

PROFIBUS

Overview

Today, distributed automation solutions based on open field buses are state-of-the-art in large areas of the manufacturing industry and process engineering. It is only with field buses that the functional benefits of digital communication can be put to full use, e.g. better resolution of measured values, diagnosis options and remote parameterization.

PROFIBUS is today's most successful open field bus with a large installed base for a wide range of application. Standardization to IEC 61158 / EN 50170 provides you with future protection for your investment.

Benefits

- A uniform modular system from the sensor into the control level enables new plant concepts
- Problem-free exchangeability of field devices, including from different manufacturers, that comply with the standard profile
- Networking of transmitters, valves, actuators etc.
- Implementation of intrinsically safe applications through use of the field bus in hazardous areas
- Easy installation of 2-wire lines for joint energy supply and data transmission
- Reduced cabling costs through savings of material and installation time
- Reduced configuration costs through central, simple engineering of the field devices (PROFIBUS PA and HART with SIMATIC PDM, also cross-vendor)
- Fast and error-free installation
- Lower service costs thanks to simpler wiring and plant structure plus extensive diagnosis options
- Greatly reduced commissioning costs through simplified loop check
- Scaling/digitizing of the measured values in the field device already, hence no rescaling necessary in SIMATIC PCS 7

Application

PROFIBUS is suitable for fast communication with distributed I/Os (PROFIBUS DP) in production automation as well as for communication tasks in process automation (PROFIBUS PA). It is the first field bus system that meets the demands of both areas with identical communication services.

The transmission technique of the PROFIBUS PA is tailored to the needs of the process industry. Interoperability between field devices from different manufacturers and remote parameterization of the field devices during operation are guaranteed by the standardized communication services.

Using SIMATIC PDM (Process Device Manager), a uniform and cross-vendor tool for configuring, parameterizing, commissioning and diagnosis of intelligent process devices on the PROFIBUS, it is possible to configure a wide variety of process devices from different manufacturers using one uniform graphical user interface.

PROFIBUS PA can just as readily be used in standard environments as well as in hazardous areas. For use in hazardous areas, PROFIBUS PA and all connected devices have to be designed with type of explosion protection Ex [i].

The uniform protocol of PROFIBUS DP and PROFIBUS PA enables the two networks to be interlinked, thus combining time-based performance with intrinsically safe transmission.

Function

PROFIBUS PA expands PROFIBUS DP with near-process components for the direct connection of actuators and sensors.

For PROFIBUS PA the RS 485 transmission technique was replaced by a different technique optimized for intrinsically safe application. Both techniques are internationally standardized in IEC 61158.

PROFIBUS PA uses the same communication protocol as PROFIBUS DP; the communication services and telegrams are identical.

For PROFIBUS PA the data and energy supply for the field devices can be directed through a 2-wire line.

Integration

Siemens field devices for process automation which are listed in this catalog and can be controlled using PROFIBUS:

PROFIBUS PA

Measuring instruments for pressure

SITRANS P DS III PA

SITRANS P300

Measuring instruments for temperature

SITRANS TH400

Flowmeters

SITRANS F M MAG 6000 19" / IP67

SITRANS F M MAG 6000 I / I Ex

SITRANS F M Transmag 2

SITRANS F C MASS 6000 19" / IP67 / Ex d

SITRANS FUS060

Measuring instruments for level

Pointek CLS200

Pointek CLS300

SITRANS Probe LU

SITRANS LR200

SITRANS LR250

SITRANS LR260

SITRANS LR400

SITRANS LR460

SITRANS LR560

Electropneumatic positioners

SIPART PS2

Acoustic sensor for pump monitoring

SITRANS DA400

PROFIBUS DP

Flowmeters

SITRANS F M MAG 6000 19" / IP67

SITRANS F M MAG 6000 I

SITRANS F C MASS 6000 19" / IP67

SIFLOW FC070 (via ET200M)

Measuring instruments for level

HydroRanger 200

MultiRanger 100/200

SITRANS LU01, LU02, LU10

Acoustic sensor for pump monitoring

SITRANS DA400

Overview

Today, distributed automation solutions based on open field buses are state-of-the-art in large areas of the process engineering industry. It is only with field buses that the functional benefits of digital communication can be put to full use, e.g. better resolution of measured values, diagnosis options and remote parameterization.

Like PROFIBUS PA, the FF bus (FOUNDATION Fieldbus) is an open field bus with a large installed base for a wide range of application. Standardization to IEC 61158 / EN 50170 provides you with future protection for your investment.

Benefits

- A uniform modular system from the sensor to the connection to the control level enables new plant concepts
- Networking of transmitters, valves, actuators etc.
- Implementation of intrinsically safe applications through use of the field bus in hazardous areas
- Easy installation of 2-wire cables for joint energy supply and data transfer
- Reduced cabling costs through savings of material and installation time.
- Reduced configuration costs through central, simple engineering of the field devices, also cross-vendor
- Fast and error-free installation
- Lower service costs thanks to simpler wiring and plant structure plus extensive diagnosis options
- Greatly reduced commissioning costs through simplified loop check
- Scaling/digitizing of the measured values in the field device already, hence no rescaling necessary in SIMATIC PCS 7

Application

The transfer technology of the FOUNDATION Fieldbus is tailored to the needs of the process industry. Interoperability between field devices from different manufacturers and remote parameterization of the field devices during operation are guaranteed by the standardized communication services.

FOUNDATION Fieldbus can just as readily be used in standard environments as in hazardous areas. For use in hazardous areas, FOUNDATION Fieldbus and all connected devices have to be designed with type of explosion protection Ex [i].

Function

FOUNDATION Fieldbus enables the direct connection of actuators and sensors.

FOUNDATION Fieldbus is based on a transfer optimized for intrinsically safe application. The transfer technology is internationally standardized in IEC 61158.

For FOUNDATION Fieldbus the data and energy supply for the field devices can be directed through a 2-wire cable.

FOUNDATION Fieldbus enables device-to-device communication ("control in the field").

Integration

Siemens field devices for process automation which are listed in this catalog and can be controlled using Foundation Fieldbus:

Measuring instruments for pressure

SITRANS P300 FF

SITRANS P DS III FF

Measuring instruments for temperature

SITRANS TH400 FF

Electropneumatic positioners

SIPART PS2 FF

Flowmeters

SITRANS F M MAG 6000

SITRANS F M MAG 6000 I / I Ex

SITRANS F C MASS 6000

Level meters

SITRANS LR250

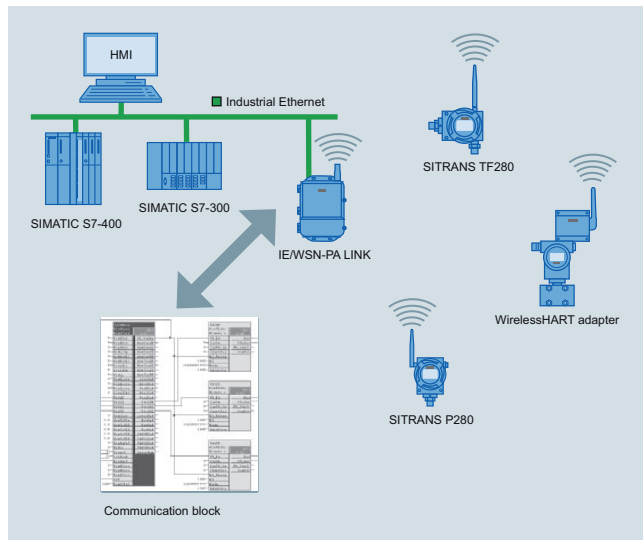
SITRANS LR560

Communication and Software

WirelessHART Communication

Communication blocks

Overview



The WirelessHART communication blocks implement the communication between S7/PCS 7 automation systems and WirelessHART field devices. They communicate via the IE/WSN-PA LINK using the Modbus TCP/IP protocol. Preconfigured communication blocks simplify the engineering process. Symbols and face plates are included in the delivery for use with SIMATIC PCS 7 OS or SIMATIC WinCC.

Benefits

A library, which can be installed, offers pre-fabricated blocks and hence an easy way to integrate WirelessHART devices into the SIMATIC automation world.

Simple configuration thanks to:

- Prefabricated function blocks for IE/WSN-PA LINK and WirelessHART devices
- SIMATIC PCS 7 OS or SIMATIC WinCC symbols and face plates are included
- Configuring help for IE/WSN-PA LINK in line with function blocks
- Output of quality codes for respective process values
- Analysis of IE/WSN-PA LINK diagnostic information

Application

WirelessHART communication blocks are used where SIMATIC automation systems communicate with WirelessHART devices via the IE/WSN-PA LINK gateway.

Function

The function blocks cyclically communicate with the IE/WSN-PA LINK via Modbus TCP/IP. Process values of WirelessHART devices as well as their status are read and made available at the function block outputs. Furthermore, selected status information of the IE/WSN-PA LINK is also made available at another building block. This information includes connection status, condition of the wireless network and other diagnostics. Precondition of the usage of these communication blocks is a TCP/IP connection, engineered in NetPro in the Engineering Station of Simatic PCS 7. Currently this requires a CP343 or a CP443-1.

Configuration

The standard S7 or PCS 7 engineering tools CFC, KOP, FUP can be used for the communication block engineering. Connection planning is done in NetPro. A configuration example for configuring the IE/WSN-PA LINK makes it easy to assign the WirelessHART devices to the communication blocks which need to be engineered.

More information

You can obtain function blocks and technical support for integrating the IE/WSN-PA LINK in PCS 7 at the following address:

Siemens AG
 Industry Sector
 Industry Solutions Division
 Industrial Technologies
 Roland Heid
 Siemensallee 84
 76187 Karlsruhe
 Germany
 Tel: +49 721 595-6380
 E-Mail: function.blocks.industry@siemens.com

Selection and Ordering data

Article No.

S7/PCS 7 function blocks for communicating with WirelessHART devices using the IE/WSN-PA LINK

9AE4110-3AA00

S7-300 or S7-400, including face plate

Overview



Maintenance Diagnostic Station

SITRANS MDS for flexible and automated diagnostic processing:

- Central display of diagnostic information from HART devices, which was only readable on site until now.
- Adjustable updating period for each device
- Clear visualization of diagnostic status of all devices
- Simply transfer of SIMATIC PDM configuring data
- Windows-based application

Benefits

SITRANS MDS in cooperation with SIMATIC PDM increases significantly the transparency of a plant.

The main advantages of SIMATIC MDS are as follows:

- Increase transparency of the plant by reading diagnostic information from accessible devices and providing a well-organized representation of this information
- Representation of diagnostic status of a device as in SIMATIC PCS 7 or NAMUR NE 107 (switchable)
- Ease of use through use of SIMATIC PDM project data
- The update cycle for the diagnostic status can be uniformly set as the default value for all devices ...
- ... as well as for each device individually

Application

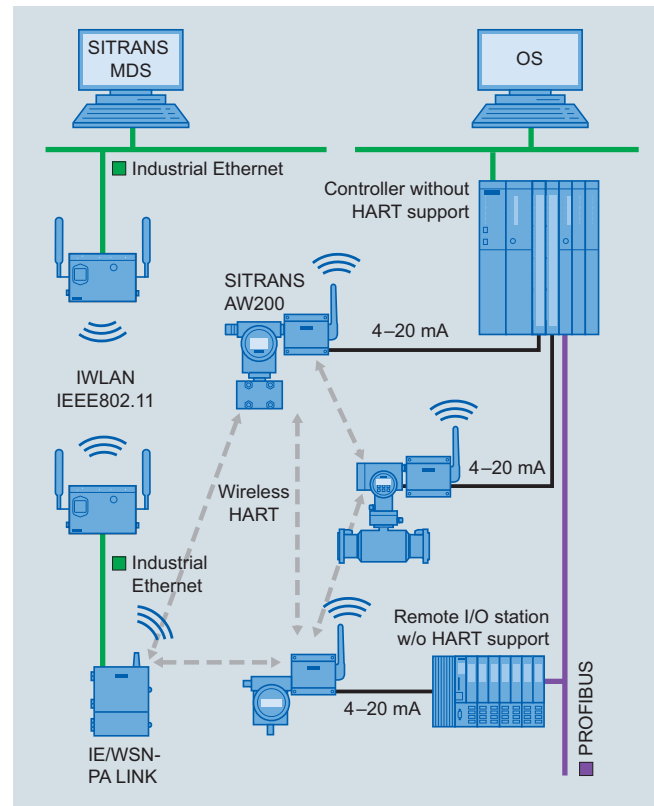
SITRANS MDS increases the transparency of a plant by centrally collecting diagnostic information, directly from the accessible field devices. In principle, all devices that are integrated in SIMATIC PDM can be included in the collecting process.

SITRANS MDS can be used where the installed automation system does not support an integrated acyclic communication of parameters and diagnostic information with the devices. In the case of HART devices, this applies to 85% of all installed devices.

The modern SIMATIC PCS 7 process control system allows for this type of continuous communication from the engineering system up to the devices. It also features a decidedly higher performance asset management system. The use of SIMATIC MDS therefore does not make sense in a SIMATIC PCS 7 environment and is hence not approved for that purpose.

Design

SITRANS MDS uses SIMATIC PDM project data to read and display diagnostic data from accessible devices.



Integration

SITRANS MDS is installed on a PC together with SIMATIC PDM. Only the stand-alone version is used in this case.

Configuration

Configuration required for SITRANS MDS is adopted from SIMATIC PDM. Only the project name must be entered.

Very few other entries are required, such as the definition of update periods.

Communication and Software

WirelessHART Communication

SITRANS MDS - Maintenance Diagnostic Station

Technical specifications

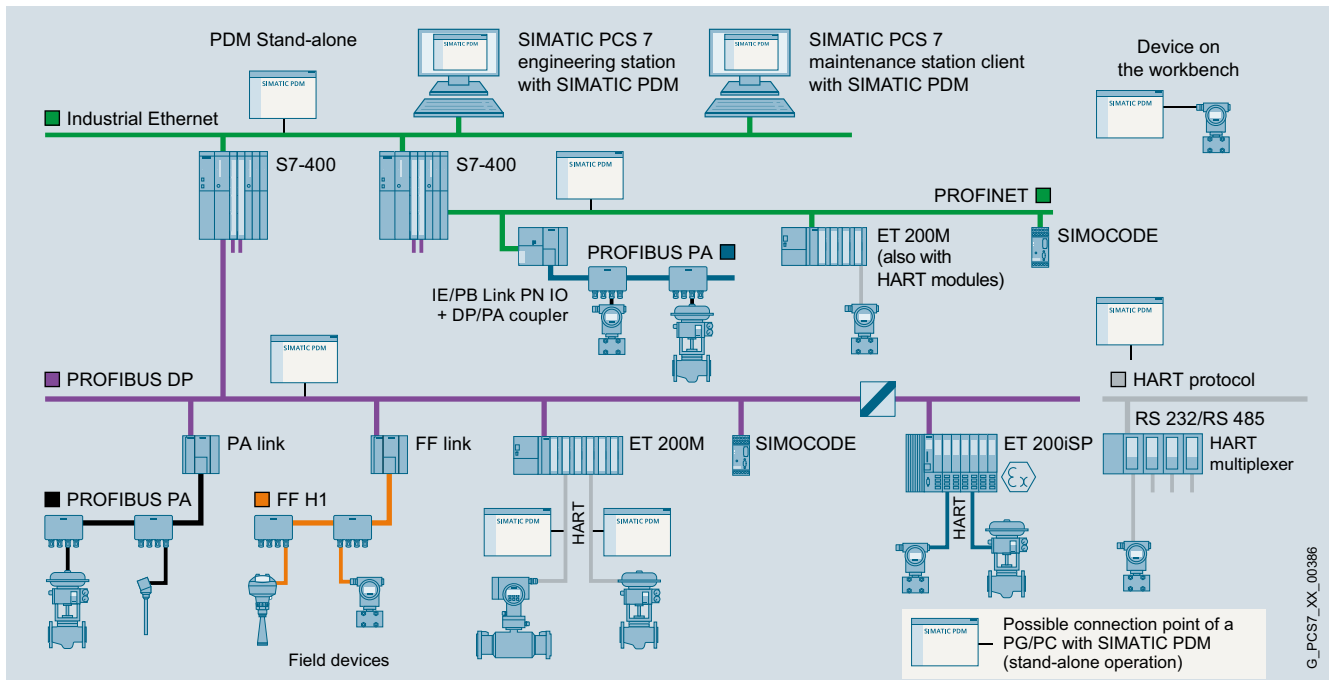
SITRANS MDS Maintenance Diagnostic Station

Operating system	Microsoft Windows XP professional SP2/SP3
Additionally required software	
SIMATIC PDM as of V 6.05 and options	
• SIMATIC PDM Basic (4 Tags)	6ES7 658-3AX16-0YA5
• SIMATIC PDM service (128 Tags)	6ES7 658-3JX16-0YA5
• SIMATIC PDM Option HART Mux	6ES7 658-3EX16-2YB5
	Additional options to increase number of measuring points
PC hardware	600 MHz 256 MB *) XGA 1024 x 768 16 Bit color depth *) main memory of at least 512 MB is recommended Up-to-date information can be found in the description for SIMATIC PDM

Selection and Ordering data

SITRANS MDS is a software package which is delivered together with the IE/WSN-PA LINK for Version 1.0.

Overview



Configuration options with SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a universal, vendor-independent tool for the configuration, parameter assignment, commissioning, diagnostics and servicing of intelligent field devices (sensors and actuators) and field components (remote I/Os, multiplexers, control-room devices, compact controllers), which in the following sections will be referred to simply as devices.

Using *one* software, SIMATIC PDM enables the processing of more than 2 500 devices from Siemens and over 200 vendors worldwide on *one* homogeneous user interface.

The user interface satisfies the requirements of the VDI/VDE GMA 2187 and IEC 65/349/CD directives. Parameters and functions for all supported devices are displayed in a consistent and uniform fashion independent of their communications interface. Even complex devices with several hundred parameters can be represented clearly and processed quickly. Using SIMATIC PDM it is very easy to navigate in highly complex stations such as remote I/Os and even connected field devices.

From the viewpoint of device integration, SIMATIC PDM is the most powerful open device manager available in the world. Devices which previously were not supported can be integrated in SIMATIC PDM by importing their device descriptions (EDD). This provides security for your investment and saves you investment costs, training expenses and follow-up costs.

SIMATIC PDM supports the operative system management in particular through:

- Uniform presentation and operation of devices
- Uniform representation of diagnostics information
- Indicators for preventive maintenance and servicing
- Detection of changes in the project and device
- Increasing the operational reliability
- Reducing the investment, operating and maintenance costs

When used in SIMATIC PCS 7, SIMATIC PDM is integrated in the maintenance station of the process control system and transmits parameter data and diagnostics information. You can change directly to the SIMATIC PDM views from the diagnostics faceplates in the Maintenance Station.

As an option, SIMATIC PDM can also be started on any SIMATIC PCS 7 maintenance station client (MS Client) in order to parameterize and diagnose the devices integrated per Electronic Device Description (EDD). In this context, SIMATIC PDM user administration based on SIMATIC Logon allows various roles with defined function privileges to be assigned to users. These function privileges refer to SIMATIC PDM system functions, e.g. writing to the device.

For all devices described per Electronic Device Description (EDD), SIMATIC PDM delivers a range of information for display and further processing on the maintenance station, e.g.:

- Device type information (electronic rating plate)
- Detailed diagnostics information (manufacturer information, information on error diagnostics and troubleshooting, further documentation)
- Results of internal condition monitoring functions
- Status information (e.g. local configuration changes)
- Information on changes (audit trail report)
- Parameter information

Communication and Software

Software

SIMATIC PDM Process Device Manager

Application

Components	Product packages						
	SIMATIC PDM stand-alone			SIMATIC PDM system-integrated			
	Minimum configuration	Basic configuration	Application-specific configurations				
	SIMATIC PDM Single Point	SIMATIC PDM Basic	SIMATIC PDM Service	SIMATIC PDM S7	SIMATIC PDM PCS 7		
V8.2	V8.2	V8.2	V8.2	V8.2	Server V8.2	FF V8.2	
SIMATIC PDM TAGs ¹⁾ in product package	1	4	4 + 100	4 + 100	4 + 100	4 + 100	4 + 100
SIMATIC PDM expansion options							
Count Relevant - 10 TAGs Licenses - 100 TAGs (accumulative) - 1 000 TAGs	<i>cannot be expanded</i>	o	o	o	o	o	o
SIMATIC PDM Basic		●	●	●	●	●	●
SIMATIC PDM Extended		o	o	●	●	●	●
SIMATIC PDM integration in STEP 7/PCS 7		o	o	●	●	●	●
SIMATIC PDM routing		o	o	o	●	●	●
SIMATIC PDM Server		o	o	o	o	●	o
SIMATIC PDM Communication FOUNDATION Fieldbus		o	o	o	o	o	●
SIMATIC PDM HART server		o	o	o	o	o	o
SIMATIC PDM command interface ²⁾		o	o	-	-	-	-

SIMATIC PDM product structure

- Product component is part of the product package
- o Optional product component for the product package; order additive
- Product component is not relevant for the product package or not available

¹⁾ For TAG definition, see "Design" section under "SIMATIC PDM TAGs"

²⁾ Only for special applications, not envisaged for wide use: Programming knowledge is necessary.

Customer-oriented product structure

SIMATIC PDM is highly versatile in the context of Totally Integrated Automation (TIA): Stand-alone or system-integrated in a SIMATIC PCS 7 / SIMATIC S7 configuration environment.

The customer-oriented products structure of SIMATIC PDM helps you to adapt the scope of functions and performance to your individual requirements. You have the following options:

SIMATIC PDM stand-alone

- Product packages for operation on a mobile computer with local bus connection or with direct connection to the device, optionally as:
 - Minimal configuration SIMATIC PDM Single Point for processing of a single field device via point-to-point coupling
 - Application-specific configuration SIMATIC PDM Service for extended service tasks
- Product package SIMATIC PDM Basic as the basis for an individual SIMATIC PDM configuration with optional product components (see table)

SIMATIC PDM system-integrated

- Product packages for integration of SIMATIC PDM in the engineering system (engineering toolset) and Maintenance Station of the SIMATIC PCS 7 process control system:
 - SIMATIC PDM PCS 7
 - SIMATIC PDM PCS 7 Server (enables SIMATIC PDM to be started on any MS client)
 - SIMATIC PDM PCS 7-FF (also supports the FOUNDATION Fieldbus H1)
- Product package SIMATIC PDM S7 for integration in a SIMATIC S7 configuration environment

In some circumstances, the various product packages can be expanded with optional product components (for details, see the Design section).

Selection criteria

In addition to considering the environment of use and the functional and performance features when selecting the product (see table in "Design" section), also observe the system requirements (see "Technical specifications" section).

Design

Product range	SIMATIC PDM Single Point	SIMATIC PDM Basic	SIMATIC PDM Service	SIMATIC PDM S7	SIMATIC PDM PCS 7		
	V8.2	V8.2	V8.2	V8.2	V8.2	Server V8.2	FF V8.2
TAGs contained	1	4	4 + 100	4 + 100	4 + 100	4 + 100	4 + 100
Project: Create offline	●	●	●	●	●	●	●
Project: Usable TAG extensions	–	●	●	●	●	●	●
Project: Process device network view	●	●	●	●	●	●	●
Project: Process device plant view	●	●	●	●	●	●	●
Project: Export/import devices	–	–	●	–	–	–	–
Project: Export/import parameters	–	o	●	●	●	●	●
Project: HW Config	–	o	o	●	●	●	●
Project: Utilization of SIMATIC PDM options	–	●	●	●	●	●	●
Project: Integration in STEP 7/PCS 7	–	o	o	●	●	●	●
Communication: HART modem	●	●	●	●	●	●	●
Communication: HART interface	●	●	●	●	●	●	●
Communication: PROFIBUS DP/PA	●	●	●	●	●	●	●
Communication: HART over PROFIBUS DP	●	●	●	●	●	●	●
Communication: FF H1	–	o ¹⁾	o ¹⁾	o	o	o	●
Communication: Modbus	●	●	●	●	●	●	●
Communication: Ethernet	●	●	●	●	●	●	●
Communication: PROFINET	●	●	●	●	●	●	●
Communication: HART over PROFINET	●	●	●	●	●	●	●
Devices: Export/import parameters	–	o	●	●	●	●	●
Devices: Comparison of parameter values	–	o	●	●	●	●	●
Devices: Saving parameters	●	●	●	●	●	●	●
Devices: Change log (Audit Trail)	–	o	●	●	●	●	●
Devices: Calibration report	–	o	●	●	●	●	●
Devices: Print function	●	o	●	●	●	●	●
Devices: Document manager	–	o	●	●	●	●	●
Lifelist: Basic functionality	●	●	●	●	●	●	●
Lifelist: Expanded functionality (scan range, diagnostics, export, addressing)	–	o	●	●	●	●	●
Communication: S7 routing	–	o	o	o	●	●	●
Communication: HART multiplexer	–	o	o	o	o	o	o
Communication: Wireless HART	–	o	o	o	o	o	o
Function: HART SHC mode (increased communication speed)	●	●	●	●	●	●	●
Function: Device parameterization on PCS 7 maintenance station clients	–	o	o	o	o	●	o

SIMATIC PDM overview of functions and features

- Product component is part of the product package
- o Optional product component for the product package; order additive
- Product component is not relevant for the product package or not available

1) Not in stand-alone mode

Communication and Software

Software

SIMATIC PDM Process Device Manager

SIMATIC PDM stand-alone product range

SIMATIC PDM Single Point V8.2

This minimum configuration with handheld functionality is designed for processing exactly *one* field device via point-to-point coupling. Additional functions or SIMATIC PDM TAGs are not possible. Upgrading to a different product variant, e.g. SIMATIC PDM Basic, or a different product version is also not possible. The device functions are supported as defined in the device description.

The following types of communication are possible:

- PROFIBUS DP/PA
- HART communication (modem, RS 232 and via PROFIBUS/PROFINET)
- Modbus
- Ethernet
- PROFINET

SIMATIC PDM Basic V8.2

Provided the system requirements are met, SIMATIC PDM Basic can be used for stand-alone operation on any computer (IPC/notebook) with local connection to bus segments or direct connection to the device. The product package features all the basic functions required for operation and parameter assignment of the devices and is enabled for the following communication modes:

- PROFIBUS DP/PA
- HART communication (modem, RS 232 and via PROFIBUS/PROFINET)
- Modbus
- Ethernet
- PROFINET

As a basic block for individual configuration, SIMATIC PDM Basic can be upgraded with all functional SIMATIC PDM options as well as with cumulative sets of 10, 100 or 1 000 SIMATIC PDM TAGs. Without TAG expansion, SIMATIC PDM Basic is suitable for projects with up to 4 TAGs.

SIMATIC PDM Service V8.2

The product package for mobile servicing applications can be executed on any computer (IPC/notebook) with a local connection to a bus segment or direct connection to field devices.

It comprises:

- SIMATIC PDM Basic (incl. 4 SIMATIC PDM TAGs)
- 100 SIMATIC PDM TAGs

Similar to SIMATIC PDM Basic, SIMATIC PDM Service can be upgraded with all functional SIMATIC PDM options as well as with cumulative sets of 10, 100 or 1 000 SIMATIC PDM TAGs.

SIMATIC PDM system-integrated product range

SIMATIC PDM S7 V8.2

The product package designed for use in a SIMATIC S7 configuration environment requires the installation of STEP 7 V5.5+SP4. It comprises:

- SIMATIC PDM Basic (incl. 4 SIMATIC PDM TAGs)
- SIMATIC PDM Extended
- SIMATIC PDM integration in STEP 7/PCS 7
- 100 SIMATIC PDM TAGs

SIMATIC PDM S7 can be expanded with the functional options SIMATIC PDM Routing, SIMATIC PDM Communication FOUNDATION Fieldbus, SIMATIC PDM Server, and SIMATIC PDM HART Server as well as with cumulative sets of 10, 100 or 1 000 SIMATIC PDM TAGs.

SIMATIC PDM PCS 7 V8.2

The product package designed for use in a SIMATIC PCS 7 configuration environment requires the installation of SIMATIC PCS 7 V8.1. SIMATIC PDM can then be integrated in the engineering toolset of the SIMATIC PCS 7 Engineering System V8.1. It comprises:

- SIMATIC PDM Basic (incl. 4 SIMATIC PDM TAGs)
- SIMATIC PDM Extended
- SIMATIC PDM integration in STEP 7/PCS 7
- SIMATIC PDM Routing
- 100 SIMATIC PDM TAGs

SIMATIC PDM PCS 7 can be expanded with the functional options SIMATIC PDM Communication FOUNDATION Fieldbus, SIMATIC PDM Server, and SIMATIC PDM HART Server (see "Optional product components") as well as with cumulative sets of SIMATIC PDM TAGs (10, 100 or 1 000).

SIMATIC PDM PCS 7 Server V8.2

The product package designed for use in a SIMATIC PCS 7 configuration environment requires the installation of SIMATIC PCS 7 V8.1. It expands the functionality of SIMATIC PDM PCS 7 by the SIMATIC PDM Server option. It is then possible to parameterize field devices integrated per Electronic Device Description (EDD) on any client of the SIMATIC PCS 7 Maintenance Station V8.1.

SIMATIC PDM PCS 7 Server can be expanded with the functional options SIMATIC PDM Communication FOUNDATION Fieldbus and SIMATIC PDM HART Server (see "Optional product components") as well as with cumulative sets of SIMATIC PDM TAGs (10, 100 or 1 000).

SIMATIC PDM PCS 7-FF V8.2

The product package designed for use in a SIMATIC PCS 7 configuration environment requires the installation of SIMATIC PCS 7 V8.1. It expands the functionality of SIMATIC PDM PCS 7 by the SIMATIC PDM Communication FOUNDATION Fieldbus option. SIMATIC PDM can then also parameterize field devices on the FOUNDATION Fieldbus H1.

SIMATIC PDM PCS 7-FF can be expanded with the functional options SIMATIC PDM Server and SIMATIC PDM HART Server (see "Optional product components") as well as with cumulative sets of SIMATIC PDM TAGs (10, 100 or 1 000).

Optional product components

SIMATIC PDM Extended V8.2 option

The SIMATIC PDM Extended option enables you to unlock other system functions for SIMATIC PDM Basic and SIMATIC PDM, for example:

- Change log
- Calibration report
- Extended information in the Lifelist
- Export and import functions
- Print functions
- Document manager
- Comparison function

This functionality is already integrated in the product packages of category "SIMATIC PDM system-integrated" (SIMATIC PDM S7, SIMATIC PDM PCS 7, SIMATIC PDM PCS 7 Server, and SIMATIC PDM PCS 7-FF).

SIMATIC PDM integration option in STEP 7/PCS 7 V8.2

This option is used for the integration of SIMATIC PDM in a SIMATIC S7 or SIMATIC PCS 7 configuration environment. SIMATIC PDM can then be started directly from the hardware configurator (HW Config) in STEP 7/SIMATIC PCS 7.

This functionality is already integrated in the product packages of category "SIMATIC PDM system-integrated" (SIMATIC PDM S7, SIMATIC PDM PCS 7, SIMATIC PDM PCS 7 Server, and SIMATIC PDM PCS 7-FF).

SIMATIC PDM Routing V8.2 option

If SIMATIC PDM is used on an engineering station, the SIMATIC PDM Routing option enables handling of every device in the field that can be configured per EDD throughout the plant and across different bus systems and remote I/Os. SIMATIC PDM Routing is offered as an optional product component for SIMATIC PDM Basic, SIMATIC PDM Service, and SIMATIC PDM S7.

Routing is already integrated in SIMATIC PDM PCS 7, SIMATIC PDM PCS 7 Server, and SIMATIC PDM PCS 7-FF.

SIMATIC PDM Server V8.2 option

This option is intended for use of SIMATIC PDM in the SIMATIC PCS 7 Maintenance Station V8.1. Selected field devices can then be handled using the SIMATIC PDM configuration GUI on each client of the SIMATIC PCS 7 Maintenance Station V8.1.

SIMATIC PDM Communication FOUNDATION Fieldbus V8.2 option

In a SIMATIC S7/PCS 7 configuration environment, using this option SIMATIC PDM can communicate with field devices on the FOUNDATION Fieldbus H1 via the FF link.

This functionality is already integrated in the SIMATIC PDM PCS 7-FF product package.

SIMATIC PDM HART Server V8.2 option

This option permits the use of HART multiplexers from various vendors in SIMATIC PDM. Furthermore, wireless HART field devices can also be parameterized with SIMATIC PDM.

SIMATIC PDM Command Interface V8.2 option

SIMATIC PDM configurations for stand-alone operation, based on the SIMATIC PDM Basic or SIMATIC PDM Service product package, can be remote-controlled by this option with regard to configuration and field device operation.

Note: The SIMATIC PDM Command Interface option can only be used specific to a project. It is not envisaged for wide use. Programming knowledge is necessary.

SIMATIC PDM TAGs (version-independent)

Depending on the project size, the SIMATIC PDM TAGs supplied with a product package (except SIMATIC PDM Single Point) can be cumulatively expanded with sets of 10, 100 or 1 000 SIMATIC PDM TAGs.

A SIMATIC PDM TAG corresponds to a SIMATIC PDM object, which represents individual field devices or components within a project, e.g. measuring instruments, positioners, switching devices or remote I/Os. SIMATIC PDM TAGs are also relevant for diagnostics with the lifelist of SIMATIC PDM. In this case, TAGs are considered to be all recognized devices with diagnostics capability, whose detailed diagnostics is effected through the device description (EDD).

SIMATIC PDM Software Media Package V8.2

The current SIMATIC PDM installation software is offered without a license in the form of the SIMATIC PDM Software Media Package. Purchasing of corresponding software licenses is necessary to unlock the product-specific functionalities.

With SIMATIC PDM product packages, type of delivery "Package" (not with optional product components), a SIMATIC PDM Software Media Package is supplied together with each ordering item. Further SIMATIC PDM Software Media Packages must be ordered separately as required.

The software of the SIMATIC PDM Media Package without a license can be used for demonstration purposes in demo mode. The SIMATIC PDM functionality is limited as follows in demo mode:

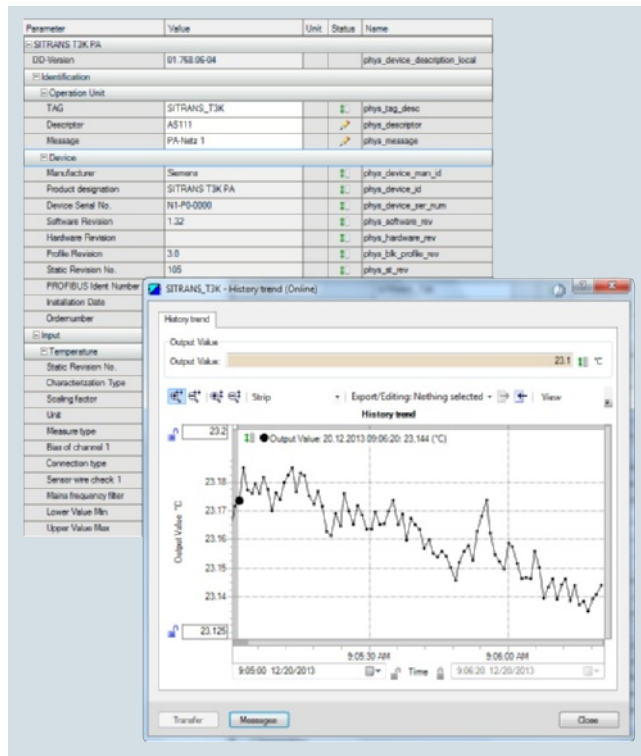
- Stand-alone operation
- Storage functions disabled
- Export and import functions disabled
- Expanded functionality disabled
- Communication functions restricted

Communication and Software

Software

SIMATIC PDM Process Device Manager

Function



SIMATIC PDM, parameter view and trend window

SIMATIC PDM core functions

- Creation of project-specific device libraries
- Adjustment and modification of device parameters
- Comparing (e.g. project and device data)
- Plausibility testing of data input
- Device identification and testing
- Device status indication (operating modes, interrupts, states)
- Simulation
- Diagnostics (standard, detailed)
- Export/import (parameter data, logs, documents)
- Management (e.g. networks and PCs)
- Commissioning functions, e.g. measuring circuit tests of device data
- Lifecycle management functions, e.g. for device replacement
- Global and device-specific modification logbook for user operations (audit trail)
- Device-specific calibration reports
- Graphic presentations of echo envelope curves, trend displays, valve diagnosis results etc.
- Presentation of incorporated manuals
- Document manager for integration of up to 10 multimedia files

Integration

Device integration

SIMATIC PDM supports all devices described by EDD (Electronic Device Description). EDD is standardized to EN 50391 and IEC 61804. Internationally it is the most widely used standardized technology for device integration. At the same time, it is the guideline of the established organizations for

- PROFIBUS and PROFINET (PI – PROFIBUS & PROFINET International)
- HART (HCF: HART Communication Foundation)
- FF (Fieldbus Foundation)

The devices are integrated directly in SIMATIC PDM through a company-specific EDD or the current HCF or Fieldbus Foundation libraries. To achieve improved transparency, they can be managed in project-specific device libraries.

Field devices are described in the EDD in terms of functionality and construction using the Electronic Device Description Language (EDDL). Using this description, SIMATIC PDM automatically creates its user interfaces with the specific device data. Existing devices can be updated, and further devices integrated into SIMATIC PDM, by simply importing the manufacturer's device-specific EDD.

Fieldbus Foundation provides pre-defined device descriptions (standard DD) for the basic functions of specific field device types. The basic functions are implemented using various standard function and transmission blocks.

Technical support

If you wish to use devices which cannot be found in the SIMATIC PDM device description library, we would be pleased to help you integrate them.

Support Request

You can request support by service specialists at Technical Support by using a "Support Request" on the Internet:

www.siemens.com/automation/support-request

Contacts in the Region

The Technical Support responsible for your Region can be found on the Internet at:

www.automation.siemens.com/partner

Technical specifications

SIMATIC PDM V8.2

Hardware	<ul style="list-style-type: none"> • PG/PC/notebook with processor corresponding to operating system requirements
Operating systems (alternative)	<ul style="list-style-type: none"> • Windows 7 Professional/Ultimate/Enterprise SP1 (32-bit/64-bit) • Windows Server 2008 R2 SP1 Standard Edition (64-bit)
Integration in STEP 7/PCS 7	<ul style="list-style-type: none"> • SIMATIC PCS 7 V8.1 (incl. update 1) • STEP 7 V5.5+SP4

Ordering data	Article No.	Article No.	
SIMATIC PDM stand-alone product packages			
Minimum configuration			
<p>SIMATIC PDM Single Point V8.2 including 1 TAG; product package for operation and configuration of one field device; communication via PROFIBUS DP/PA, HART (modem, RS 232, PROFIBUS/PROFINET), Modbus, Ethernet or PROFINET</p> <p>Additional functions or SIMATIC PDM TAGs are not possible</p> <p>6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user</p> <ul style="list-style-type: none"> • Delivery form package (without SIMATIC PCS 7 Software Media Package) License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position • Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license <u>Notes:</u> E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package. 	<p>6ES7658-3HA28-0YA5</p> <p>6ES7658-3HA28-0YH5</p>	<p>Configuration for mobile service</p> <p>SIMATIC PDM Service V8.2 Product package for stand-alone user in service, with</p> <ul style="list-style-type: none"> • SIMATIC PDM Basic incl. 4 TAGs • 100 TAGs <p>6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user</p> <ul style="list-style-type: none"> • Delivery form package (without SIMATIC PCS 7 Software Media Package) License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position • Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license <u>Notes:</u> E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package. 	<p>6ES7658-3JD28-0YA5</p> <p>6ES7658-3JD28-0YH5</p>
Basic configuration for individual product packages			
<p>SIMATIC PDM Basic V8.2 including 4 TAGs; product package for operation and configuration of field devices and components; communication via PROFIBUS DP/PA, HART (modem, RS 232, PROFIBUS/PROFINET), Modbus, Ethernet or PROFINET</p> <p>6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user</p> <ul style="list-style-type: none"> • Delivery form package (without SIMATIC PCS 7 Software Media Package) License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position • Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license <u>Notes:</u> E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package. 	<p>6ES7658-3AB28-0YA5</p> <p>6ES7658-3AB28-0YH5</p>	<p>Configuration for integration in SIMATIC S7 configuration environment</p> <p>SIMATIC PDM S7 V8.2 Product package for use in a SIMATIC S7 configuration environment, with</p> <ul style="list-style-type: none"> - SIMATIC PDM Basic incl. 4 TAGs - SIMATIC PDM Extended - SIMATIC PDM integration in STEP 7/PCS 7 - 100 TAGs <p>6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user</p> <p><u>Note:</u> STEP 7 V5.5+SP4 is required to use the full functionality of SIMATIC PDM S7 V8.2!</p> <ul style="list-style-type: none"> • Delivery form package (without SIMATIC PCS 7 Software Media Package) License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position • Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license <u>Notes:</u> E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package. 	<p>6ES7658-3KD28-0YA5</p> <p>6ES7658-3KD28-0YH5</p>

Communication and Software

Software

SIMATIC PDM Process Device Manager

Configuration for integration in SIMATIC PCS 7 configuration environment

SIMATIC PDM PCS 7 V8.2

Product package for integration into the engineering toolset of the SIMATIC PCS 7 engineering system
6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit

Floating license for 1 user, with
- SIMATIC PDM Basic incl. 4 TAGs
- SIMATIC PDM Extended
- SIMATIC PDM integration in STEP 7/PCS 7
- SIMATIC PDM Routing
- 100 TAGs

Note:

SIMATIC PCS 7 V8.1 is required to use the full functionality of SIMATIC PDM PCS 7 V8.2!

- Delivery form package (without SIMATIC PCS 7 Software Media Package)
License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package)
License key download and online certificate of license

Notes:

E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package.

6ES7658-3LD28-0YA5

6ES7658-3LD28-0YH5

SIMATIC PDM PCS 7-FF V8.2

Product package for integration into the engineering toolset of the SIMATIC PCS 7 engineering system
6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit

Floating license for 1 user, with
- SIMATIC PDM Basic incl. 4 TAGs
- SIMATIC PDM Extended
- SIMATIC PDM integration in STEP 7/PCS 7
- SIMATIC PDM Routing
- SIMATIC PDM Communication FOUNDATION Fieldbus
- 100 TAGs

Note:

SIMATIC PCS 7 V8.1 is required to use the full functionality of SIMATIC PDM PCS 7-FF V8.2!

- Delivery form package (without SIMATIC PCS 7 Software Media Package)
License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package)
License key download and online certificate of license

Notes:

E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package.

6ES7658-3MD28-0YA5

6ES7658-3MD28-0YH5

SIMATIC PDM PCS 7 Server V8.2

Product package for integration into the engineering toolset of the SIMATIC PCS 7 engineering system

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit

Floating license for 1 user, with
- SIMATIC PDM Basic incl. 4 TAGs
- SIMATIC PDM Extended
- SIMATIC PDM integration in STEP 7/PCS 7
- SIMATIC PDM Routing
- SIMATIC PDM Server
- 100 TAGs

Note:

SIMATIC PCS 7 V8.1 is required to use the full functionality of SIMATIC PDM PCS 7 Server V8.2!

- Delivery form package (without SIMATIC PCS 7 Software Media Package)
License key USB stick and certificate of license, bundled with 1 × SIMATIC PDM Software Media Package per ordering position
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package)
License key download and online certificate of license

Notes:

E-mail address required; installation software also available separately as SIMATIC PDM Software Media Package.

6ES7658-3TD28-0YA5

6ES7658-3TD28-0YH5

Optional product components for SIMATIC PDM V8.2

SIMATIC PDM Extended V8.2

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key USB stick and certificate of license
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license
Note:
E-mail address required!

6ES7658-3NX28-2YB5

6ES7658-3NX28-2YH5

SIMATIC PDM Integration in STEP 7/SIMATIC PCS 7 V8.2

only required for integration of SIMATIC PDM into HW Config

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key USB stick and certificate of license
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license
Note:
E-mail address required!

6ES7658-3BX28-2YB5

6ES7658-3BX28-2YH5

SIMATIC PDM Routing V8.2

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key USB stick and certificate of license
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download, online certificate of license
Note:
E-mail address required!

6ES7658-3CX28-2YB5

6ES7658-3CX28-2YH5

SIMATIC PDM Server V8.2

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key USB stick, certificate of license
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license
Note:
E-mail address required!

6ES7658-3TX28-2YB5

6ES7658-3TX28-2YH5

SIMATIC PDM Communication FOUNDATION Fieldbus V8.2

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key USB stick and certificate of license
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license
Note:
E-mail address required!

6ES7658-3QX28-2YB5

6ES7658-3QX28-2YH5

SIMATIC PDM HART Server V8.2

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key USB stick and certificate of license
- Delivery form online (without SIMATIC PCS 7/SIMATIC PDM Software Media Package) License key download and online certificate of license
Note:
E-mail address required!

6ES7658-3EX28-2YB5

6ES7658-3EX28-2YH5

Communication and Software

Software

SIMATIC PDM Process Device Manager

SIMATIC PDM

Command Interface V8.2

6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit, floating license for 1 user

- Delivery form package (without SIMATIC PCS 7/SIMATIC PDM Software Media Package)
License key USB stick and certificate of license

6ES7658-3SX28-2YB5

SIMATIC PDM TAGs

TAG licenses for expanding the available TAG volume, cumulative, software class A, floating license for 1 user

- Delivery form package
License key on USB stick and certificate of license
 - 10 TAGs
 - 100 TAGs
 - 1 000 TAGs
- Delivery form online
License key download and online certificate of license

Note:

E-mail address required!

- 10 TAGs
- 100 TAGs
- 1 000 TAGs

6ES7658-3XC00-2YB5

6ES7658-3XD00-2YB5

6ES7658-3XE00-2YB5

6ES7658-3XC00-2YH5

6ES7658-3XD00-2YH5

6ES7658-3XE00-2YH5

SIMATIC PDM

Software Media Package

SIMATIC PDM

Software Media Package V8.2

Installation software without license, 6 languages (English, German, French, Italian, Spanish, Chinese), software class A, runs with Windows 7 Ultimate 32/64-bit or Windows Server 2008 R2 Standard 64-bit

Note: Can only be used in conjunction with a valid license or in demo mode!

- Delivery form package (without SIMATIC PCS 7 Software Media Package)
SIMATIC PDM and device library software on DVD
- Delivery form online (without SIMATIC PCS 7 Software Media Package)
SIMATIC PDM and device library software download

Note:

E-mail address required!

6ES7658-3GX28-0YT8

6ES7658-3GX28-0YG8

More information

Update/Upgrade

Product packages and optional product components from the product range of SIMATIC PDM V6.0, V6.1, V8.0 or V8.1 (incl. service pack) can be directly upgraded to V8.2 using upgrade packages. Excepted from this are SIMATIC PDM Single Point and SIMATIC PDM Communication via standard HART multiplexer.

Product packages and optional product components from the product range of SIMATIC PDM V7.0 can first be upgraded to V8.0 and then to V8.2.

When upgrading to SIMATIC PDM V8.2, be aware of the compatible versions of SIMATIC PCS 7 and STEP 7.

A Software Update Service in the form of a subscription is also offered for SIMATIC PDM.

For further information, see catalog ST PCS 7.

Overview



SITRANS DTM provides an easy way for Field Device Tool (FDT)/ Device Type Manager (DTM) users to parameterize Siemens Instruments using international standards.

Benefits

- Same look and feel for all Siemens field instruments
- Support for Quick start wizards and other dialog boxes
- Quick overview using table and tree views
- Online and offline configuration
- Conformity to IEC profiles for HART and PROFFIBUS

Application

Electronic Device Description (EDD) is a proven way to describe the behavior and functionality of field instruments and other automation components.

For many years, EDD-based tools such as SIMATIC PDM from Siemens or handheld communicator have been used successfully in the process industry. Some years ago, an additional technology called FDT / DTM with the same approach was introduced to the market. To support the FDT DTM Technology for Siemens devices, the software SITRANS DTM has been developed which combines both EDD and FDT technologies.

SITRANS DTM uses EDDs as the device description and provides the DTM interface to allow the integration of our field instruments into FDT-frame applications.

The following field instruments are currently available in SITRANS DTM:

- SITRANS TH300 HART
- SITRANS TH400 PA
- SITRANS P300 HART
- SITRANS P500
- SITRANS P DSIII HART
- SITRANS F M MAG 6000 DP/PA
- SITRANS F C MASS 6000 PA/PA
- SITRANS FC430
- SITRANS PROBE LU 6 m, 12 m, HART
- SITRANS LR200 HART, PA
- SITRANS LR250 HART, PA
- SITRANS LR260 HART, PA
- SITRANS LR560 HART, PA
- SITRANS LUT400 HART
- SIPART PS2 HART, PA, FF

Technical specifications

SITRANS DTM

Version

Current Version	3.1
• Compatible with PACTware versions	3.6, 4.0, 4.1
• Compatible with Windows	XP, 7
• Certified by FDT group	Yes

Free DTM software can be downloaded from:
<http://www.siemens.com/sitransdtm>

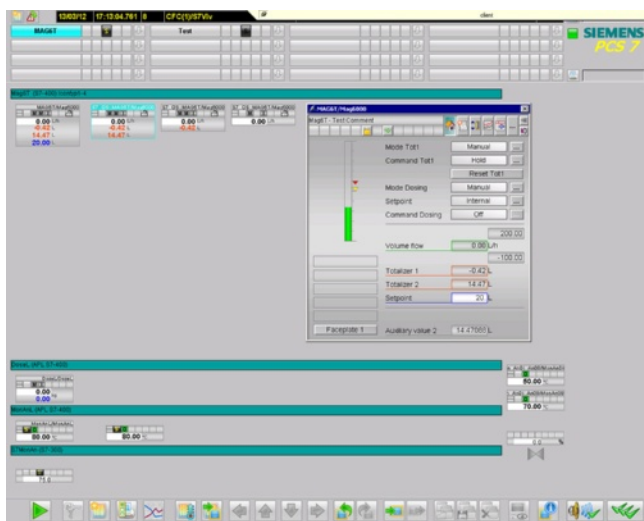
Click on Support in the collateral list on the right side of the web page, and choose Software downloads.

Communication and Software

Software

SITRANS Library

Overview



The SITRANS Library for SIMATIC PCS 7 V8.0 extends standard functionality of the SIMATIC PCS 7 process control system concentrated in the SIMATIC PCS 7 Advanced Process Library (APL) with technological blocks and faceplates for device-specific functions of the SITRANS field devices.

Benefits

This allows you to easily operate all device functions, such as the dosing of the SITRANS FM MAG6000, in a single faceplate. In addition, it also supports operation and monitoring via Touch Panels as well as the integration in SIMATIC S7 applications. The SITRANS Library is based on the modern design of the Advanced Process Library (APL). Together with the APL, the SITRANS Library enables you to create harmonic solutions with a consistent look & feel and optimum use of the functions of the SITRANS field devices in many industries.

It helps accelerate the engineering process, reduces the time-to-market, and simplifies process control. In addition, operator functions (such as "Dosing") and process-related diagnostic information (such as empty pipe detection and flow direction) are provided.

Note:
SITRANS Library can be used in combination with SIMATIC PCS 7 version V8.0 and higher.

Application

The total solution described can be used in the following sectors of the process industry:

- Chemical industry
- Pharmaceutical industry
- Water and wastewater
- Glass and solar
- Oil & gas
- Food and beverage industry
- Minerals and mining

Design

The product structure, however, is geared toward the operational environment in the SIMATIC PCS 7 process control system. Consequently, SITRANS Library is offered in the form of an engineering component:

- SITRANS Library
Engineering software with engineering license for one customer plant
- SITRANS Library
Runtime license for one automation system (SIMATIC PCS 7 automation systems of all designs and S7-300 controllers)

The SITRANS Library product component enables you to perform configuration work on a SIMATIC PCS 7 engineering station.

The SITRANS Library product component allows you to run blocks from a library on an automation system.

When using function blocks from SITRANS Library in SIMATIC PCS 7 automation systems, note that SIMATIC PCS 7 AS Runtime POs are also booked.

Function

SITRANS Library for SIMATIC PCS 7

Sublibrary for the functional expansion of the SIMATIC PCS 7 Advanced Process Library with:

- Function blocks and faceplates for the SITRANS F M MAG 6000 DP with dosing function for SIMATIC S7-400, SIMATIC S7-300 and panel interface blocks
- Function blocks and faceplates for SITRANS field devices for SIMATIC S7-400 and SIMATIC S7-300 with WinCC.

The function blocks are configured in CFC.

Control and monitoring from a panel is configured with the panel interface blocks for example for the SITRANS F M MAG 6000 DP. Taking operating rights and hierarchical operating concepts (multi-control room operation) into consideration, the technological function can then be operated from both an operator station and a Touch Panel.

Detailed information for which field devices which systems and system versions are supported see under <http://support.automation.siemens.com/WW/view/en/85285872>

Selection and Ordering Data

Article No.

SITRANS Library

Block library for SIMATIC PCS 7 V8.0 and SIMATIC S7 with function blocks and face plates as well as electronic documentation

Engineering software, software class A, two languages (English, German), runs under operation system
Windows XP Professional 32 Bit,
Windows 7 Ultimate 32/64 Bit,
Windows Server 2003 R2 Standard 32 Bit or
Windows Server 2008 R2 Standard 64 Bit,
single license for 1 installation

- Engineering license for one customer plant.
Delivery form: can be downloaded, with certificate of license

7MP2990-0AA00

Appendix



9/2	Siemens Industry Training
9/3	Course offer for Process Instrumentation
9/4	PIA Life Cycle Portal
9/4	Engineering, Ordering, Installation and Operation Tool
9/5	Delivery time
9/6	Pressure Equipment Directive (97/23/EC)
9/9	Functional safety
9/10	Partners at Industry
	Siemens Automation Cooperates with Education
9/11	Applicable practical know-how
	Online Services
9/13	Information and Ordering in the Internet and on DVD
9/14	Information and Download Center, Social Media, Mobile Media
	Industry Services
9/15	Your machines and plants can do more – with Industry Services
9/16	Industry Services for the entire life cycle
9/20	Software Licenses
9/22	Conditions of sale and delivery

Appendix

Siemens Industry Training

Faster and more applicable know-how: Hands-on training from the manufacturer

Siemens Industry Training provides you with comprehensive support in solving your tasks.

Training by the market leader in the industry enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.



First-class know-how directly pays for itself: In shorter startup times, high-quality end products, faster troubleshooting and reduced downtimes. In other words, increased profits and lower costs.

Achieve more with Siemens Industry Training

- Shorter times for startup, maintenance and servicing
- Optimized production operations
- Reliable configuration and startup
- Minimization of plant downtimes
- Flexible plant adaptation to market requirements
- Compliance with quality standards in production
- Increased employee satisfaction and motivation
- Shorter familiarization times following changes in technology and staff

Contact

Visit our site on the Internet at:

www.siemens.com/sitrain

or let us advise you personally.

Siemens Industry Training Customer Support Germany:

Phone: +49 911 895-7575

Fax: +49 911 895-7576

E-Mail: info@sitrain.com

Highlights Siemens Industry Training

Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

Wide variety

With a total of about 300 local attendance courses, we train the complete range of Siemens Industry products as well as interaction of the products in systems.

Tailor-made training

We are only a short distance away. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You wish to have individual training instead of one of our 300 courses? Our solution: We will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

The right mixture: Blended learning

"Blended learning" is a combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Additional effect: Reduced traveling costs and periods of absence.



Course offer for Process Instrumentation

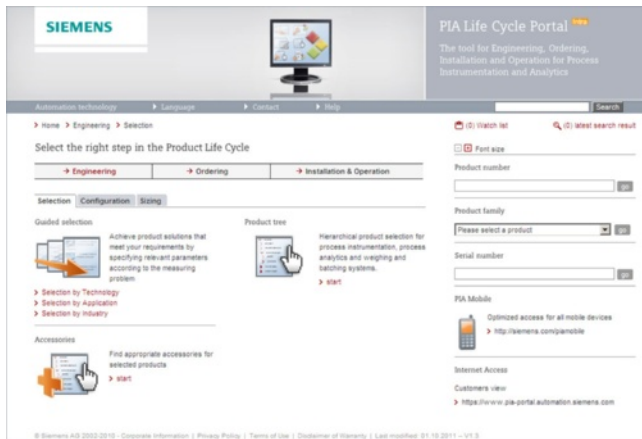
	Course suitable for			Duration/ Medium	Course code
	Planning	Realization	Operation		
Basis Service Training for Process Instruments	✓	✓	✓	5 days	SC-PI-BST
WirelessHART Basic Training (for Siemens employees)	✓	✓	✓	2 days	SC-PI-WHB
Introduction into Process Instrumentation and Process Analytics (for Siemens employees)	✓	✓	✓	2 days	SC-TP-GS1
PROFIBUS, HART and SIMATIC PDM in Process Automation - Technology and Sales	✓	✓	✓	3 days	SC-TP-T1S
Advanced Trainings PS1 Pressure, Temperature and Positioner (for Siemens employees)	✓	✓	✓	3,5 days	SC-PI1-ADV
Pressure-, Temperature Measurement and Electropneumatic Positioners - Technology and Sales	✓	✓	✓	4,5 days	SC-PI1-T1S
2 days Training Pressure and Temperature	✓	✓	✓	2 days	SC-PI1-PT
2 days Training Positioner	✓	✓	✓	2 days	SC-PI1-SIP
PI3 Advanced Service-Training - COMPLETE		✓	✓	10 days	AST-ALL
PI3 Advanced Service-Training - Communication		✓	✓	1 day	AST-COM
PI3 Advanced Service-Training - MASS		✓	✓	1 day	AST-FC
PI3 Advanced Service-Training - FC430		✓	✓	1 day	AST-FC400
PI3 Advanced Service-Training - MAG		✓	✓	1 day	AST-FM
PI3 Advanced Service-Training - MAG 8000		✓	✓	1 day	AST-FM8000
PI3 Advanced Service-Training - Transmag		✓	✓	1 day	AST-FMT
PI3 Advanced Service-Training - ClampOn		✓	✓	1 day	AST-FUC
PI3 Advanced Service-Training - SONO Inline		✓	✓	1 day	AST-FUI
PI3 Advanced Service-Training - SONOKIT		✓	✓	1 day	AST-FUK
PI3 Advanced Service-Training - Vortex		✓	✓	1 day	AST-FX
Flow Measurement - Technology and Sales	✓	✓	✓	5 days	SC-PI3-T1S
Level Measurement - Technology and Sales	✓	✓	✓	4 days	SC-PI2-T1S
Siemens Weighing Technology, Basic Training (for Siemens employees)	✓	✓	✓	2 Tage	SC-WT-BAS
Static Weighing Technology	✓	✓	✓	4 days	SC-WT-STAT
Dynamic Weighing Technology	✓	✓	✓	3 days	SC-WT-DYN
SIWAREX Sensor System and Electronics FTC-L		✓	✓	3 days	SC-WT-FTCL
Weighing Technology, Belt Scales, Weighfeeder		✓	✓	3 days	SC-WT-BELT
SIWAREX WP231	✓	✓	✓	1 day	SC-WT-WP23

Appendix

PIA Life Cycle Portal

Engineering, Ordering, Installation and Operation Tool

Overview



The PIA Life Cycle Portal provides the appropriate functionality in all stages of the Product Life Cycle for products of Process Instrumentation, Process Analytics and Weighing Technology.

The application guides you through Engineering & Selection, supports you at the Order and provides tools and information for Installation and Operation.

- **Phase 1:** Selection & Planning
- **Phase 2:** Ordering
- **Phase 3:** Installation & Operation
- **Additional features:** e. g. PIA Mobile

Phase 1: Selection & Planning



Selection

Achieve product solutions that meet your requirements by specifying relevant parameters according to the measuring point by using the *guided selection* or select the product directly in the *product and accessories tree*.



Configuration

Configure a selected product step by step and use the integrated configuration knowledge to avoid errors.



Sizing & calculation

Sizing & calculation tools for Gas Analyzers, Weighing and Batching Systems and Flow measurement instruments.

Phase 2: Ordering



Bulk upload

Verify several part numbers in one step by uploading a simple text file.



Watchlist & projects

Collect products in a *watch list* and save it as a *project* for later use.



Interface to the Industry Mall

Order the selected products with the ordering system for Siemens' automation and drive solutions.

Phase 3: Installation & Operation



Spare parts

Find appropriate *spare parts* for selected products or corresponding product families.



After sales support

Go to the *Service and Support Portal* to access manuals, certificates and further information concerning service & support.



Device information and history

Serial number specific product information for installed devices

Additional features



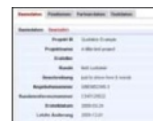
Personalize

Register in order to customize the application to your personal needs.



PIA Mobile

Use the product *selection, configuration and device information and history* with the version optimized for mobile devices.
www.siemens.com/piamobile



Product details

Find all relevant product information at a single glance: commercial and technical data, certificates, images and documents etc.

More information

PIA Life Cycle Portal
Ostliche Rheinbrückenstraße 50
76187 Karlsruhe, Germany
Tel.: +49 (721) 595 2114
E-Mail: support.pia-portal@siemens.com
www.siemens.com/pia-portal

Overview



Fast Delivery Time

Our devices are anything but products off the rack. Numerous customer requirements can be taken into account when configuring any of our products. This results in large variety.

In the selection and ordering data, we show you how to use various identifiers to locate the products from our standard portfolio and stock items.

Quick Ship Programm

Selection and Ordering data		Article No.
Pressure transmitters for absolute pressure from gauge pressure series, SITRANS P DS III with HART		7 MF 4 2 3 3 -
Measuring cell filling	Measuring cell cleaning	
Silicone oil	normal	1
Inert liquid	grease-free to cleanliness level 2	3
Measuring span (min. ... max.)		
8.3 ... 250 mbar a	(0.12 ... 3.62 psia)	D
43 ... 1300 mbar a	(0.62 ... 18.85 psia)	F
0.16 ... 5 bar a	(2.32 ... 72.5 psia)	G
1 ... 30 bar a	(14.5 ... 435 psia)	H
Wetted parts materials		
Seal diaphragm	Process connection	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version for diaphragm seal		Y
Process connection		
• Connection shank G½B to EN 837-1		0
• Female thread ½-14 NPT		1
• Stainless steel oval flange with process connection (Oval flange has no female thread)		
- Mounting thread 7/16-20 UNF to EN 61518		2
- Mounting thread M10 to DIN 19213		3
- Mounting thread M12 to DIN 19213		4
• Male thread M20 x 1.5		5
• Male thread ½-14 NPT		6
Non-wetted parts materials		
• Housing made of die-cast aluminium		0
• Housing stainless steel precision casting		3



Ordering options with the  identifier refer to products from our Quick Ship Program. If you combine only ordering options that are marked with a , these product variants can be produced and delivered within 5 to 15 days in limited quantity.

Contact

If you have questions about delivery time or the Quick Ship program, please contact your Siemens sales representative.

Stock Items

Selection and Ordering data		Article No.	Order code
SIPART PS2 electropneumatic positioner in enclosure made of Makrolon, aluminum and stainless steel		6 DR 5	
Version			
2-wire (4 to 20 mA)			
• Without HART	▶	0	
• With HART, <u>not</u> explosion-protected	▶	1	
2-, 3-, 4-wire (0/4 to 20 mA)			
• With HART, explosion-protected	▶	2	
• Without HART, <u>not</u> explosion-protected		3	
PROFIBUS PA connection		5	
FOUNDATION Fieldbus connection		6	
For actuator			
Single-acting	▶	1	
Double-acting	▶	2	
Enclosure			
Makrolon	▶	0	
Aluminum; only single-acting		1	1
Stainless steel (without window)		2	
Explosion protection			
Without	▶		N
In type of protection (ATEX/IECEX/FM/CSA)	▶		E
• intrinsic safety			
With protection type (ATEX/IECEX) ¹⁾			D
• Non-sparking			
• Dust protection via enclosure			

Ordering options with the  identifier refer to stock items. If you combine only ordering options that are marked with a , such a combination can be ordered from stock. If your order quantity is available from stock, your order usually leaves the warehouse within one day.

Appendix

Pressure Equipment Directive (97/23/EC)

General

The pressure equipment directive **97/23/EC** applies to the alignment of the statutory orders of the European member states for pressure equipment. Such equipment in the sense of the directive includes vessels, pipelines and accessories with a maximum permissible pressure of more than **0.5 bar** above atmospheric.

The pressure equipment directive can be used starting November 29, 1999, and is compulsory starting May 29, 2002.

Division according to the danger potential

Equipment is divided in line with the pressure equipment directive according to the danger potential (medium/pressure/volume/nominal diameter) into the categories I to IV or Article 3 Paragraph 3.

The following criteria are decisive for assessment of the danger potential, and are also shown in Diagrams 1 to 4 and 6 to 9:

• Fluid group	Group 1 or 2
• Aggregate state	Liquid or gaseous
• Type of pressurized equipment	
- Vessel	Product of pressure and volume (PS * V [barL])
- Pipeline	Nominal diameter, pressure or product of pressure and nominal diameter (PS * DN)

Fuelled pressure equipment or equipment heated in another manner are shown separately in Diagram 5.




Note:

Liquids according to Article 3 are those liquids whose steam pressure is **not** more than **0.5 bar** above standard atmospheric pressure (1013 mbar) at the maximum permissible temperature.

The **maximum permissible temperature** for the used liquids is the maximum process temperature which can occur, as defined by the user. This must be within the limits defined for the equipment.

Division of media (liquid/gaseous) into the fluid groups

Fluids are divided according to Article 9 into the following fluid groups:

Group 1	Explosive	Very toxic
	R phrases: e.g.: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44)	R phrases: e.g.: 26, 27, 28, 39 (32)
	R phrases: e.g.: 12 (17)	Toxic R phrases: e.g.: 23, 24, 25 (29, 31)
	R phrases: e.g.: 11, 15, 17 (10, 30)	Oxidizing R phrases: e.g.: 7, 8, 9 (14, 15, 19)

Flammable (where the maximum allowable temperature is above flash-point)

Group 2

All fluids not belonging to Group 1.

Also applies to fluids which are e.g. dangerous to the environment, corrosive, dangerous to health, irritant or carcinogenic (if not highly toxic).

Conformity rating

Pressure equipment of categories I to IV must comply with the safety requirements of the directive and be assigned the CE symbol.

They must comply with a conformity rating procedure according to Appendix III of the directive.

Pressure equipment according to Article 3 Paragraph 3 must be designed and manufactured in agreement with the sound engineering practice SEP applying in a member country, and must not be assigned a CE symbol (CE symbols from other directives are not affected).

Siemens has carried out a conformity rating, assigned a CE symbol, and issued a declaration of conformity for its products (providing the equipment is not within the context of Article 3 Paragraph 3).

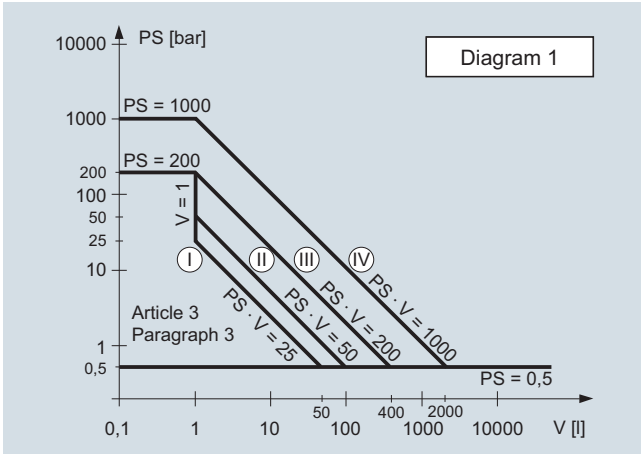
Supervision of the design, dimensioning, testing and manufacture is carried out according to module H (comprehensive quality assurance).

Notes:

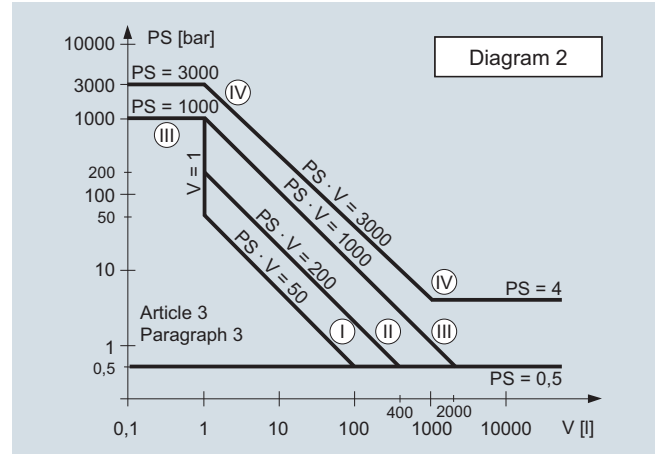
- Equipment designed for media with a high danger potential (e.g. gases of fluid group 1) may also be used for media with a lower danger potential (e.g. gases of fluid group 2, or liquids of fluid groups 1 and 2).
- The pressure equipment directive according to Article 1 Paragraph 1 does not apply to equipment such as e.g. mobile offshore plants, ships, aircraft, water supply and waste water networks, nuclear plants, rockets and pipelines outside industrial plants.



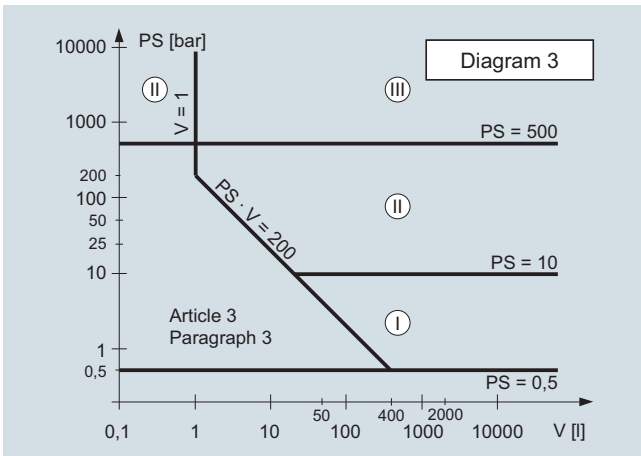
Diagrams



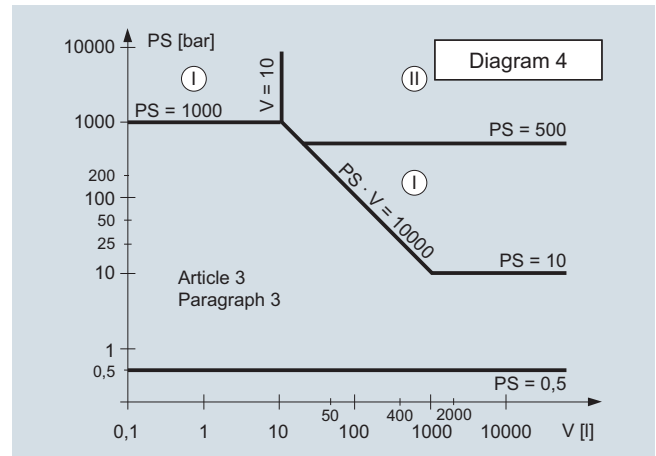
- Gases of fluid group 1
- Vessels according to Article 3 Number 1.1 Letter a) First dash
- Exception: unstable gases belonging to Categories I and II must be included in Category III.



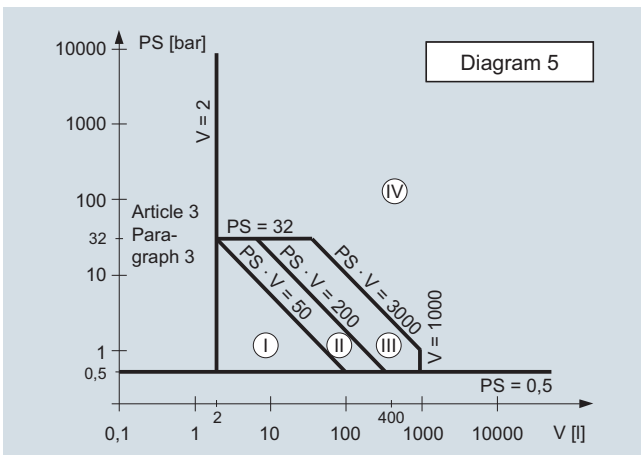
- Gases of fluid group 2
- Vessels according to Article 3 Number 1.1 Letter a) Second dash
- Exception: fire extinguishers and bottles for breathing apparatus: at least Category III.



- Liquids of fluid group 1
- Vessels according to Article 3 Number 1.1 Letter b) First dash



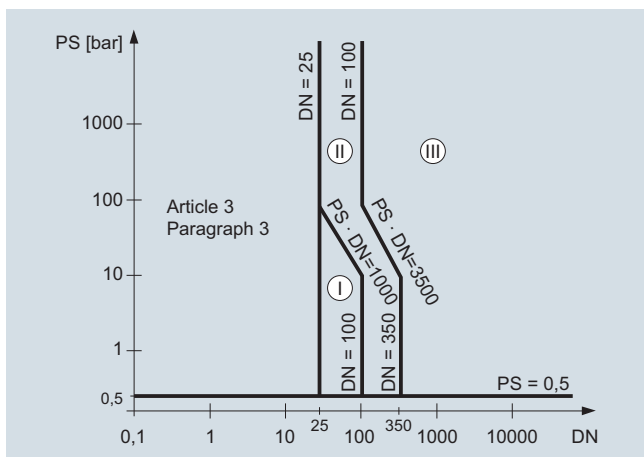
- Liquids of fluid group 2
- Vessels according to Article 3 Number 1.1 Letter b) Second dash
- Exception: modules for producing warm water



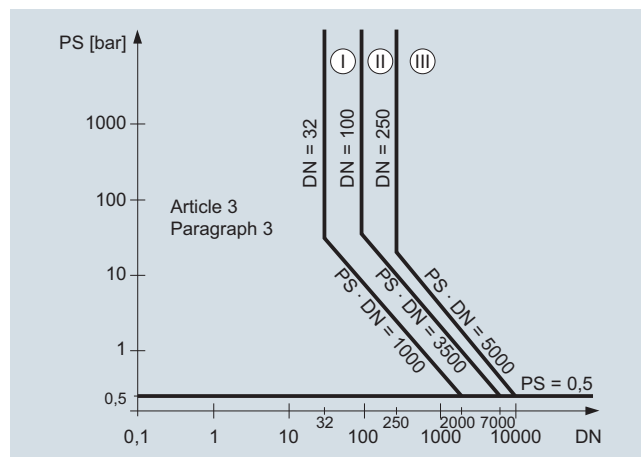
- Fuelled pressure equipment or equipment heated in another manner above 110 °C and liable to overheating.
- Vessel according to Article 3 Number 1.2
- Exception: pressure cooker, test procedure at least according to Category III.

Appendix

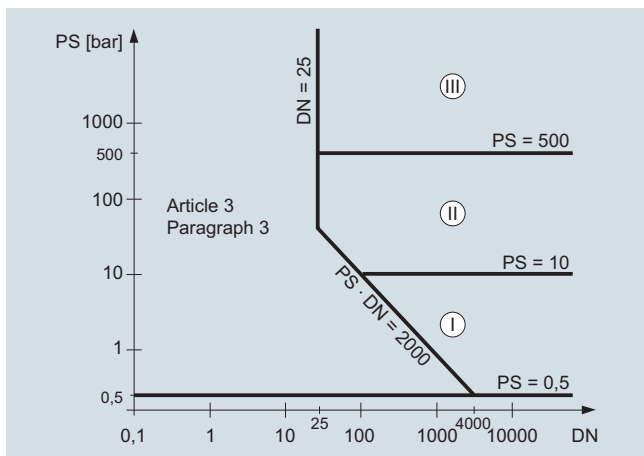
Pressure Equipment Directive (97/23/EC)



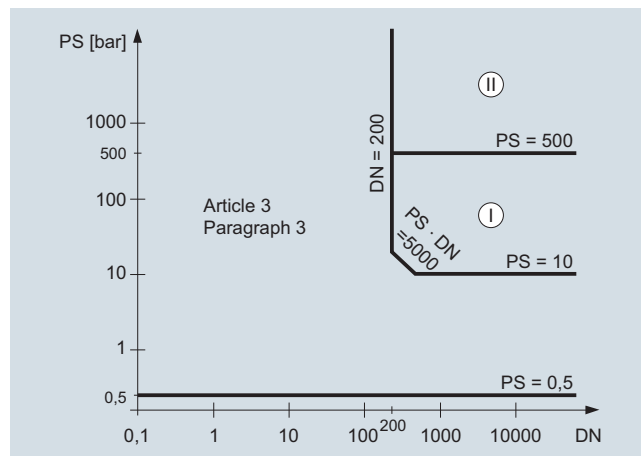
- Gases of fluid group 1
- Pipelines according to Article 3 Number 1.3 Letter a) First dash
- Exception: unstable gases belonging to Categories I and II must be included in Category III.



- Gases of fluid group 2
- Pipelines according to Article 3 Number 1.3 Letter a) Second dash
- Exception: liquids at temperatures > 350 °C belonging to Category II must be included in Category III.



- Liquids of fluid group 1
- Pipelines according to Article 3 Number 1.3 Letter b) First dash



- Liquids of fluid group 2
- Pipelines according to Article 3 Number 1.3 Letter b) Second dash

Overview



Functional safety

Functional safety is a strong tradition at Siemens. Werner von Siemens realized as early as 1880 that safety in automated processes is not only a human obligation, it also makes economic sense. In the process industry, hazards for humans, plants and the environment must be minimized without affecting the production process. With Safety Integrated for Process Automation from Siemens, you benefit from a comprehensive product and service offering for safe, fault-tolerant applications.

What is the Safety Integrity Level (SIL)?

The Safety Integrity Level is a term from the field of functional safety. It helps you assess electrical/electronic/programmable electronic systems in terms of the reliability of their safety functions. The goal is to minimize the risk of malfunction of the system and thereby increase the protection of the employed personnel, the environment and property.

The international standard IEC 61508 describes the type of risk assessment as well as measures for designing appropriate safety functions ranging from sensors, logic processing and extending to actuators. The requirements for the process industry are further specified in IEC 61511-1.

Since the standards IEC 61508 and IEC 61511 for functional safety have been in effect, the demand for process instrumentation equipment conforming to SIL classification has continually increased. For this reason, the product portfolio is constantly expanded to include devices that meet the SIL standard.

You will find the current list of SIL devices from Siemens for process instrumentation available today at:

www.siemens.com/SIL

Additional information

Brochure: "Functional Safety in Process Instrumentation with SIL Rating"

http://www.automation.siemens.com/w1/efiles/automation-technology/pi/SIL/SIL_Broschuere_en.pdf

Website: "Functional Safety"

<http://www.industry.siemens.com/topics/global/en/safety-integrated>

Appendix

Partner at Industry



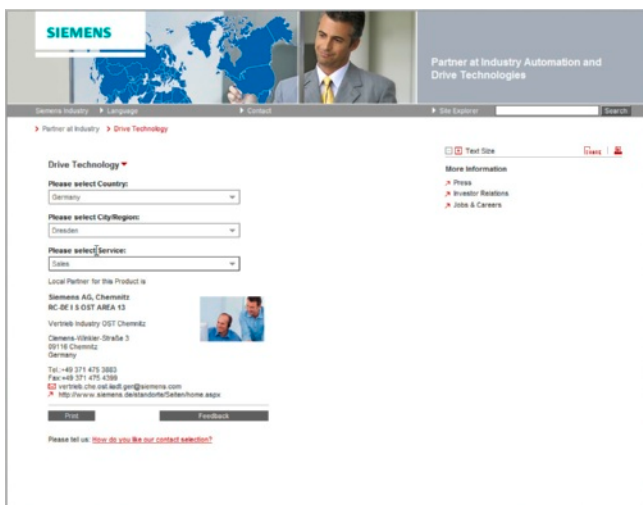
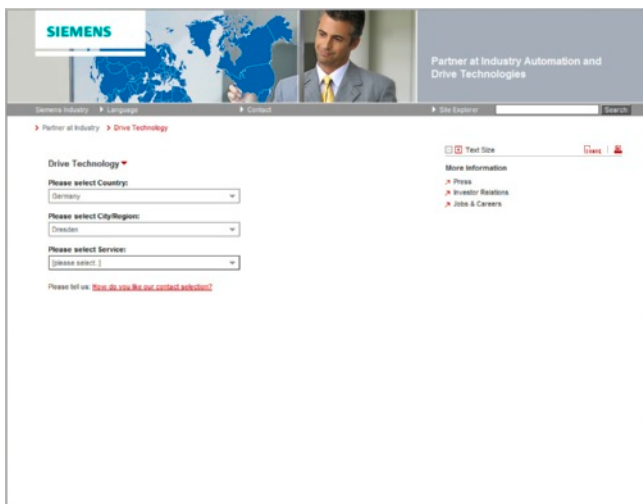
At Siemens Industry we are resolutely pursuing the same goal: long-term improvement of your competitive ability. We are committed to this goal. Thanks to our commitment, we continue to set new standards in automation and drive technology. In all industries – worldwide.

At your service locally, around the globe for consulting, sales, training, service, support, spare parts ... on the entire Industry Automation and Drive Technologies range.

Your personal contact can be found in our Contacts Database at: www.siemens.com/automation/partner

You start by selecting a

- Product group,
- Country,
- City,
- Service.



Comprehensive teaching support for educational institutions

Cooperates
with Education

Automation

SIEMENS

Siemens Automation Cooperates with Education (SCE)

offers a global system for sustained support of technical skills. SCE supports educational institutions in their teaching assignment in the industrial automation sector and offers added value in the form of partnerships, technical expertise, and know-how. As the technological leader, our comprehensive range of services can support you in the knowledge transfer for Industry 4.0.

Our services at a glance

- Training curriculums for your lessons
- Trainer packages for hands-on learning
- Courses convey up-to-date, specialist knowledge
- Support for your projects/textbooks
- Complete didactic solutions from our partners
- Personal contact for individual support

Training curriculums for your lessons

Use our profound industrial know-how for practice-oriented and individual design of your course. We offer you more than 100 didactically prepared training curriculums on the topics of automation and drives technology free of charge. These materials are perfectly matched to your curricula and syllabuses, and optimally suited for use with our trainer packages. This takes into account all aspects of a modern industrial solution: installation, configuration, programming, and commissioning. All documents, including projects, can be individually matched to your specific requirements.

Particular highlights:

- With the new SIMATIC PCS 7 curriculums and trainer packages, you can pass on basic, practice-oriented PCS 7 knowledge at universities within about 60 hours (= 1 semester), using plant simulation.

- The new TIA Portal training materials for SIMATIC S7-1200 are available in English, German, French, Italian, Spanish and Chinese for download.

www.siemens.com/sce/documents

Trainer packages for hands-on learning

Our SCE trainer packages offer a specific combination of original industrial components which are perfectly matched to your requirements and can be conveniently used in your course. These price reduced bundles available exclusively to schools include innovative and flexible hardware and software packages. SCE can currently offers more than 90 SCE trainer packages including related equipment. These cover both the factory and process automation sectors. You can use them to impart the complete course contents on industrial automation at a very low cost.

Trainer packages are available for:

- Introduction to automation technology with LOGO! logic module and SIMATIC S7-1200 compact controller
- PLC engineering with SIMATIC S7 hardware and STEP 7 software (S7-300, S7-1500 and TIA Portal)
- Operator control and monitoring with SIMATIC HMI
- Industrial networking over bus systems with SIMATIC NET (PROFINET, PROFIBUS, IO-Link)
- Sensor systems with VISION, RFID and SIWAREX
- Process automation with SIMATIC PCS 7
- Power Monitoring Devices SENTRON PAC 4200
- Motor Management SIMOCODE
- Networked drive and motion technologies with SINAMICS/SIMOTION
- CNC programming with SinuTrain

Important ordering notes:

Only the following institutions are authorized to obtain trainer packages: vocational schools, Colleges and Universities, in-house vocational training departments, non commercial research institutions and non commercial training departments.

To purchase a trainer package, you require a specific end-use certificate, which you can obtain from your regional sales office.

www.siemens.com/sce/tp

Appendix

Siemens Automation Cooperates with Education

Applicable practical know-how

Comprehensive teaching support for educational institutions (continued)

Courses convey up-to-date specialist knowledge



Profit from our excellent know-how as the leader in industrial technologies. We offer you specific courses for automation and drive technology worldwide. These support you in the practice-oriented transferring of product and system know-how, are in conformance with curriculums, and derived from the training fields. Compact technical courses especially for use at universities are also available.

Our range of courses comprises a wide variety of training modules based on the principle of Totally Integrated Automation (TIA). The focus is on the same subject areas as with the SCE trainer packages.

Every PLC and drive course is oriented on state-of-the-art technology. Your graduates can thus be prepared optimally for their future professional life.

In some countries we are offering classes based on our training curriculums. Please inquire with your SCE contact partner.

www.siemens.com/sce/contact

Support for your projects/textbooks



Automation and drive technology is characterized by continuous and rapid developments. Service and Support therefore play an important role.

We can provide you with consulting for selected projects and support from your personal SCE contact as well as our web based and regional Customer Support.

As a particular service, SCE supports technical authors with our know-how as well as with intensive technical consulting. Siemens library of special textbooks covering the industrial automation sector provides an additional resource for you and your students. These can be found at the SCE web site.

www.siemens.com/sce/contact
www.siemens.com/sce/books

Complete didactic solutions



Our partners for learning systems offer a wide range of training systems and solutions for use in your courses or laboratory.

These models have been designed based on our trainer packages and thus save you the time and cost of self-construction of individual components. The Partner systems provide you with simple and effective help in the fulfillment of your teaching assignment.

www.siemens.com/sce/partner

Contact for individual support

You can find your personal SCE contact on our Internet site. Your local SCE Promoter will answer all your questions concerning the complete SCE offering, and provide you with timely and competent information about innovations. When you encounter challenges, you can profit from our global team of excellence.

If a direct SCE contact is not listed for your country, please contact your local Siemens office.

www.siemens.com/sce/contact

SCE Support Finder for your Internet request

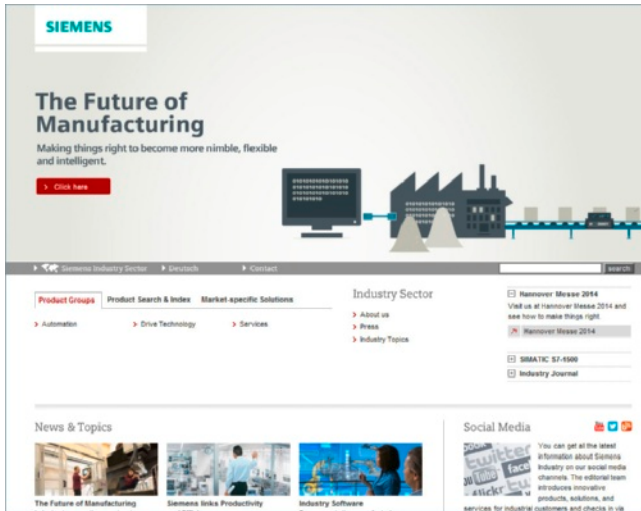
You are an educator and need support on the topic of industry automation? Send us your request:

www.siemens.com/sce/supportfinder

Scan the QR
code for further
information
(SCE homepage)



Siemens Industry Automation and Drive Technologies in the WWW



A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

www.siemens.com/industry

you will find everything you need to know about products, systems and services.

Product Selection Using the Interactive Catalog CA 01 of Industry



Detailed information together with convenient interactive functions:

The interactive catalog CA 01 covers more than 80 000 products and thus provides a full summary of the Siemens Industry Automation and Drive Technologies product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives. All information is linked into a user interface which is easy to work with and intuitive.

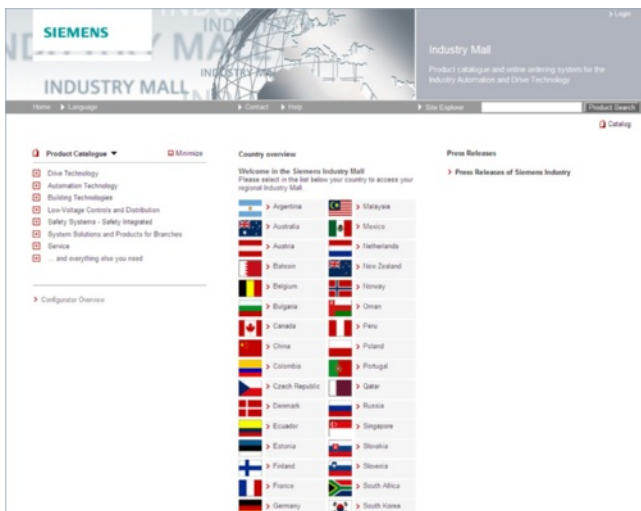
After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalog CA 01 can be found in the Internet under

www.siemens.com/automation/ca01

or on DVD.

Easy Shopping with the Industry Mall



The Industry Mall is the electronic ordering platform of Siemens AG on the Internet. Here you have online access to a huge range of products presented in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking and tracing of the order to be carried out. Availability checks, customer-specific discounts and preparation of quotes are also possible.

Numerous additional functions are available to support you.

For example, powerful search functions make it easy to select the required products. Configurators enable you to configure complex product and system components quickly and easily. CAx data types are also provided here.

Please visit the Industry Mall on the Internet under:

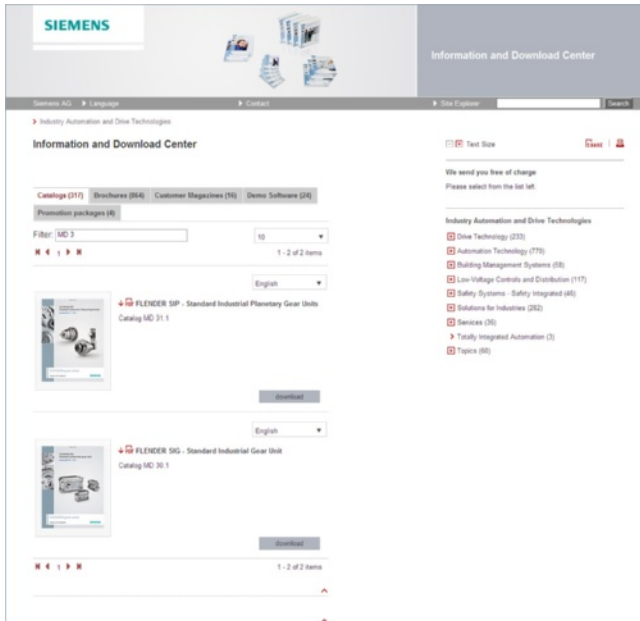
www.siemens.com/industrymall

Appendix

Online Services

Information and Download Center, Social Media, Mobile Media

Downloading Catalogs



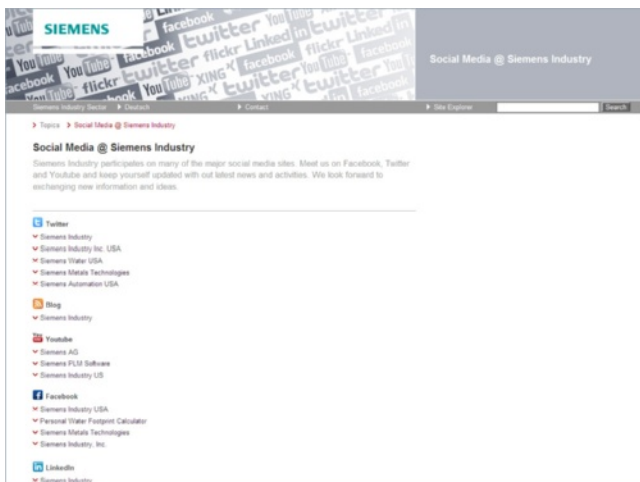
In addition to numerous other useful documents, you can also find the catalogs listed on the back inside cover of this catalog in the Information and Download Center. Without having to register, you can download these catalogs in PDF format or increasingly as digital page-turning e-books.

The filter dialog box above the first catalog displayed makes it possible to carry out targeted searches. If you enter "MD 3" for example, you will find both the MD 30.1 and MD 31.1 catalogs. If you enter "ST 70" both the ST 70 catalog and the associated news or add-ons are displayed.

Visit us on the web at:

www.siemens.com/industry/infocenter

Social Media



Connect with Siemens through social media: visit our social networking sites for a wealth of useful information, demos on products and services, the opportunity to provide feedback, to exchange information and ideas with customers and other Siemens employees, and much, much more. Stay in the know and follow us on the ever-expanding global network of social media.

Connect with Siemens Industry at our central access point:

www.siemens.com/industry/socialmedia

Or via our product pages at:

www.siemens.com/automation

or

www.siemens.com/drives

To find out more about Siemens' current social media activities visit us at:

www.siemens.com/socialmedia

Mobile Media



Discover the world of Siemens.

We are also constantly expanding our offering of cross-platform apps for smartphones and tablets. You will find the current Siemens apps at the app store (iOS) or at Google Play (Android).

The Siemens app, for example, tells you all about the history, latest developments and future plans of the company – with informative pictures, fascinating reports and the most recent press releases.

Your machines and plant can do more – with Industry Services.

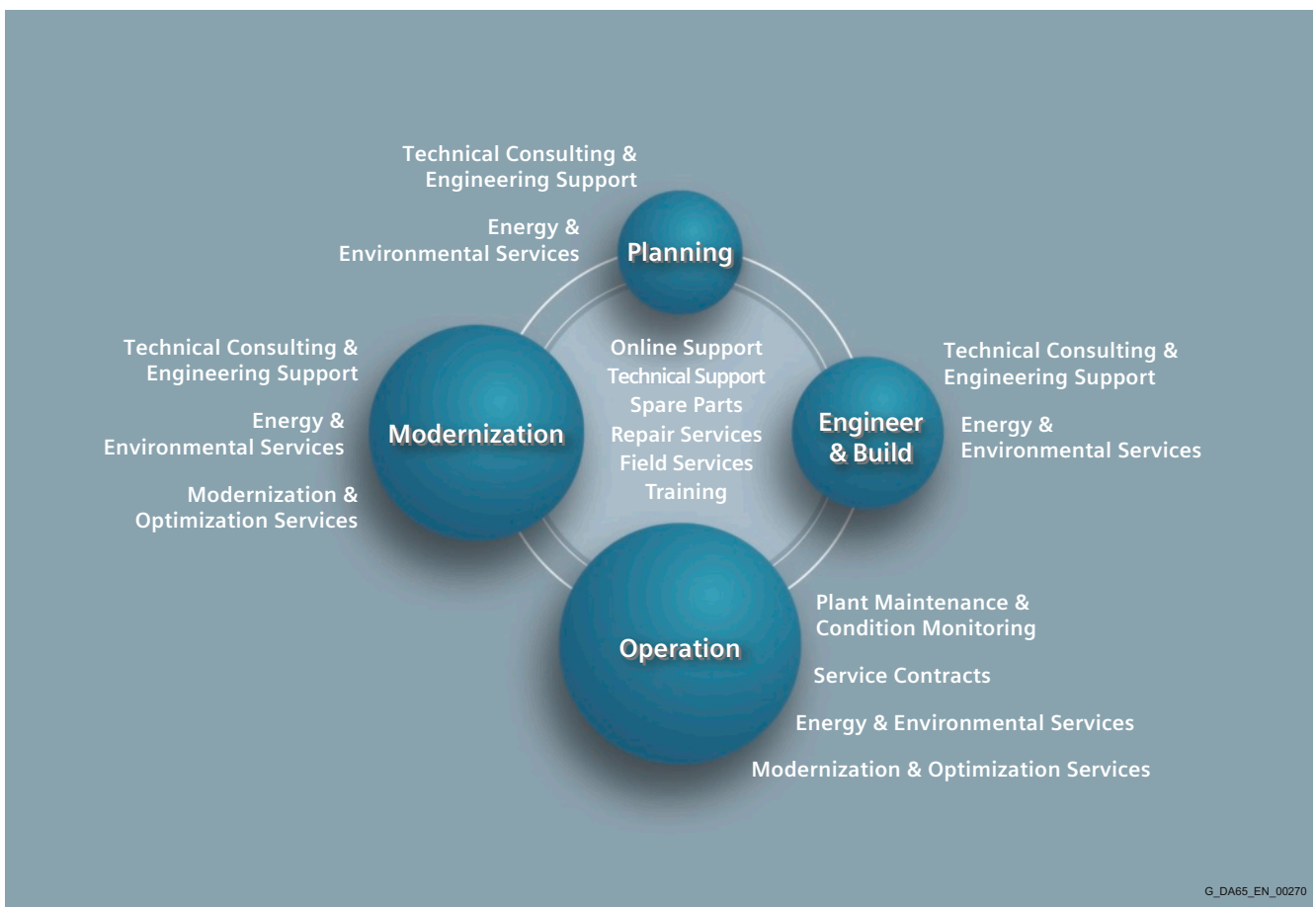


Whether it is production or process industry - in view of rising cost pressure, growing energy costs, and increasingly stringent environmental regulations, services for industry are a crucial competitive factor in manufacturing as well as in process industries.

All over the world Siemens supports its customers with product, system, and application-related services throughout the entire life cycle of a plant. Right from the earliest stages of planning, engineering, and building, all the way to operation and modernization. These services enable customers to benefit from the Siemens experts' unique technological and product knowledge and industry expertise.

Thus downtimes are reduced and the utilization of resources is optimized. The bottom line: increased plant productivity, flexibility, and efficiency, plus reduced overall costs.

Discover all advantages of our service portfolio:
www.siemens.com/industry-services



G_DA65_EN_00270

Siemens supports its clients with technology based Services across a plants entire life cycle.

Appendix

Industry Services

Industry Services for the entire life cycle

Online Support

Online support is a comprehensive information system for all questions relating to products, systems, and solutions that Siemens has developed for industry over time. With more than 300,000 documents, examples and tools, it offers users of automation and drive technology a way to quickly find up-to-date information. The 24-hour service enables direct, central access to detailed product information as well as numerous solution examples for programming, configuration and application.

The content, in six languages, is increasingly multimediated – and now also available as a mobile app. Online support's "Technical Forum" offers users the opportunity to share information with each other. The "Support Request" option can be used to contact Siemens' technical support experts. The latest content, software updates, and news via newsletters and Twitter ensure that industry users are always up to date.



www.siemens.com/industry/onlinesupport

Online Support App



Using the Online Support app, you can access over 300,000 documents covering all Siemens industrial products - anywhere, any time. Regardless of whether you need help implementing your project, fault-finding, expanding your system or are planning a new machine.

You have access to FAQs, manuals, certificates, characteristics curves, application examples, product notices (e.g. announcements of new products) and information on successor products in the event that a product is discontinued.

Just scan the product code printed on the product directly using the camera of your mobile device to immediately see all technical information available on this product at a glance. The graphical CAx information (3D model, circuit diagrams or EPLAN macros) is also displayed. You can forward this information to your workplace using the e-mail function.

The search function retrieves product information and articles and supports you with a personalized suggestion list. You can find your favorite pages – articles you need frequently – under

"mySupport". You also receive selected news on new functions, important articles or events in the News section.

Scan the QR code
for information on
our Online Support
app.



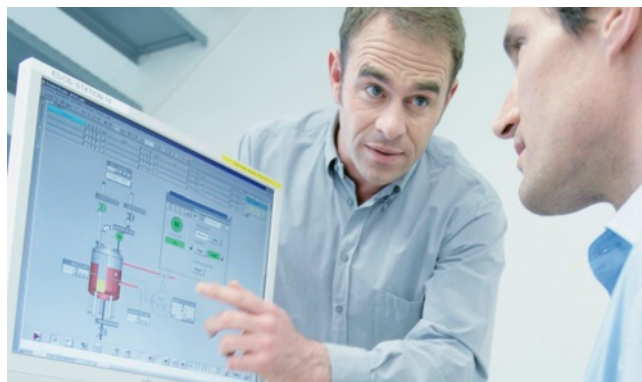
The app is available free of charge from the Apple App Store (iOS) or from Google Play (Android).

www.siemens.com/industry/onlinesupportapp

9

Technical Support

The ability to quickly analyze system and error messages and take appropriate action are key factors in ensuring that plants run safely and efficiently. Questions can arise at any time and in any industry, whether it's an individual product or a complete automation solution. Siemens technical support offers individual technical assistance in matters related to functionality, how to operate, applications, and fault clearance in industrial products and systems – at any time and globally, over the phone, by e-mail, or via remote access. Experienced experts from Siemens answer incoming questions promptly. Depending on the requirements, they first consult specialists in the areas of development, on-site services, and sales. Technical support is also available for discontinued products that are no longer available. Using the support request number, any inquiry can be clearly identified and systematically tracked.



Spare Parts

Drive and automation systems must be available at all times. Even a single missing spare part can bring the entire plant to a standstill – and result in substantial financial losses for the operator. The spare parts services from Siemens protects against such losses – with the aid of quickly available, original spare parts that ensure smooth interaction with all other system components. Spare parts are kept on hand for up to ten years; defective parts can be returned. For many products and solutions, individual spare parts packages ensure a preventive stock of spare parts on-site. The spare parts services is available around the world and around the clock. Optimum supply chain logistics ensure that replacement components reach their destination as quickly as possible. Siemens' logistics experts take care of planning and management as well as procurement, transportation, customs handling, warehousing, and complete order management for spare parts.



Repair Services

Reliable electrical and electronic equipment is crucial for operating continuous processes. That is why it is essential that motors and converters always undergo highly specialized repair and maintenance. Siemens offers complete customer and repair services – on site and in repair centers – as well as technical emergency services worldwide. The repair services include all measures necessary to quickly restore the functionality of defective units. In addition, services such as spare parts logistics, spare parts storage and rapid manufacturing are available to plant operators in all verticals. With a global network of certified repair shops operated by Siemens as well as third parties, Siemens handles the maintenance and overhaul of motors, converters, and other devices as an authorized service partner.



Field Services

It's a top priority in all industries: the availability of plants and equipment. Siemens offers specialized maintenance services such as inspection and upkeep as well as rapid fault clearance in industrial plants – worldwide, continuously, and even with emergency services as needed. The services include startup as well as maintenance and fault clearance during operation. The startup service includes checking the installation, function tests, parameterization, integration tests for machines and plants, trial operation, final acceptance, and employee training. All services, including remote maintenance of drives, are also available as elements of customized service contracts.



Appendix

Industry Services

Industry Services for the entire life cycle

Training

Increasingly, up-to-date knowledge is becoming a determining factor in success. One of the key resources of any company is well-trained staff that can make the right decision at the right moment and take full advantage of the potential. With SITRAIN – Training for Industry, Siemens offers comprehensive advanced training programs. The technical training courses convey expertise and practical knowledge directly from the manufacturer. SITRAIN covers Siemens' entire product and system portfolio in the field of automation and drives. Together with the customer, Siemens determines the company's individual training needs and then develops an advanced training program tailored to the desired requirements. Additional services guarantee that the knowledge of all Siemens partners and their employees is always up-to-date.



Technical Consulting & Engineering Support

The efficiency of plants and processes leads to sustainable economic success. Individual services from Siemens help save substantial time and money while also guaranteeing maximum safety. Technical consulting covers the selection of products and systems for efficient industrial plants. The services include planning, consulting, and conceptual design as well as product training, application support, and configuration verification – in all phases of a plant's lifecycle and in all questions related to product safety. Engineering support offers competent assistance throughout the entire project, from developing a precise structure for startup to product-specific preparation for implementation as well as support services in areas such as prototype development, testing and acceptance.



Energy & Environmental Services

Efficient energy use and resource conservation – these top sustainability concerns pay off – both for the environment and for companies. Siemens offers integrated solutions that unlock all technical and organizational potential for successful environmental management. Customized consulting services are aimed at sustainably lowering the cost of energy and environmental protection and thus increasing plant efficiency and availability. The experts provide support in the conceptual design and implementation of systematic solutions in energy and environmental management, enabling maximum energy efficiency and optimized water consumption throughout the entire company. Improved data transparency makes it possible to identify savings potential, reduce emissions, optimize production processes, and thereby noticeably cut costs.



Modernization & Optimization Services

High machine availability, expanded functionality and selective energy savings – in all industries, these are decisive factors for increasing productivity and lowering costs. Whether a company wants to modernize individual machines, optimize drive systems, or upgrade entire plants, Siemens' experts support the projects from planning to commissioning.

Expert consulting and project management with solution responsibility lead to security and make it possible to specifically identify savings potential in production. This secures investments over the long term and increases economic efficiency in operation.



Plant Maintenance & Condition Monitoring

Modern industrial plants are complex and highly automated. They must operate efficiently in order to ensure the company's competitive strength. In addition, the steadily increasing networking of machines and plants require consistent security concepts. Maintenance and status monitoring as well as the implementation of integrated security concepts by Siemens' experts support optimum plant use and avoid downtime. The services include maintenance management as well as consulting on maintenance concepts, including the complete handling and execution of the necessary measures. Complete solutions also cover remote services, including analysis, remote diagnosis, and remote monitoring. These are based on the Siemens Remote Services platform with certified IT security.



Service Contracts

Making maintenance costs calculable, reducing interfaces, speeding up response times, and unburdening the company's resources – the reduced downtimes that these measures achieve increase the productivity of a plant. Service contracts from Siemens make maintenance and repairs more cost-effective and efficient. The service packages include local and remote maintenance for a system or product group in automation and drive technology. Whether you need extended service periods, defined response times, or special maintenance intervals, the services are compiled individually and according to need. They can be adjusted flexibly at any time and used independently of each other. The expertise of Siemens' specialists and the capabilities of remote maintenance thus ensure reliable and fast maintenance processes throughout a plant's entire lifecycle.



Appendix

Software Licenses

Overview

Software types

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.

Data generated with engineering software and executable programs can be duplicated for your own use or for use by third parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.

The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.

You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.

Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Industry Automation & Drive Technologies offers various types of software license:

- Floating license
- Single license
- Rental license
- Rental floating license
- Trial license
- Demo license
- Demo floating license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software per license.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per instance, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific period of time (the operating hours do not have to be consecutive).

One license is required for each installation of the software.

Rental floating license

The rental floating license corresponds to the rental license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Demo license

The demo license support the "sporadic use" of engineering software in a non-productive context, for example, use for testing and evaluation purposes. It can be transferred to another license. After the installation of the license key, the software can be operated for a specific period of time, whereby usage can be interrupted as often as required.

One license is required per installation of the software.

Demo floating license

The demo floating license corresponds to the demo license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Certificate of license (CoL)

The CoL is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.

A separate upgrade must be purchased for each original license of the software to be upgraded.

Overview**ServicePack**

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Industry Automation & Drive Technologies supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Software Update Service (SUS)

As part of the SUS contract, all software updates for the respective product are made available to you free of charge for a period of one year from the invoice date. The contract will automatically be extended for one year if it is not canceled three months before it expires.

The possession of the current version of the respective software is a basic condition for entering into an SUS contract.

You can download explanations concerning license conditions from www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

Appendix

Conditions of sale and delivery

1. General Provisions

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Please note that the scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

1.1 For customers with a seat or registered office in Germany

For customers with a seat or registered office in Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"¹⁾ and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office in Germany"¹⁾ and,
- for other supplies and services, the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"¹⁾.

1.2 For customers with a seat or registered office outside Germany

For customers with a seat or registered office outside Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"¹⁾ and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office outside of Germany"¹⁾ and
- for other supplies and/or services, the "General Conditions for Supplies of Siemens Industry for Customers with a Seat or Registered Office outside of Germany"¹⁾.

2. Prices

The prices are in € (Euro) ex point of delivery, exclusive of packaging.

The sales tax (value added tax) is not included in the prices. It shall be charged separately at the respective rate according to the applicable statutory legal regulations.

Prices are subject to change without prior notice. We will charge the prices valid at the time of delivery.

To compensate for variations in the price of raw materials (e.g. silver, copper, aluminum, lead, gold, dysprosium and neodym), surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The metal factor of a product indicates the basic official price (for those raw materials concerned) as of which the surcharges on the price of the product are applied, and with what method of calculation.

An exact explanation of the metal factor can be downloaded at: www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

To calculate the surcharge (except in the cases of dysprosium and neodym), the official price from the day prior to that on which the order was received or the release order was effected is used.

To calculate the surcharge applicable to dysprosium and neodym ("rare earths"), the corresponding three-month basic average price in the quarter prior to that in which the order was received or the release order was effected is used with a one-month buffer (details on the calculation can be found in the explanation of the metal factor).

3. Additional Terms and Conditions

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches apply only to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the individual pages of this catalog - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

4. Export regulations

We shall not be obligated to fulfill any agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes and/or other sanctions.

Export of goods listed in this catalog may be subject to licensing requirements. We will indicate in the delivery details whether licenses are required under German, European and US export lists. Goods labeled with "AL" not equal to "N" are subject to European or German export authorization when being exported out of the EU. Goods labeled with "ECCN" not equal to "N" are subject to US re-export authorization.

The export indications can be viewed in advance in the description of the respective goods on the Industry Mall, our online catalog system. Only the export labels "AL" and "ECCN" indicated on order confirmations, delivery notes and invoices are authoritative.

Even without a label, or with label "AL:N" or "ECCN:N", authorization may be required i .a. due to the final disposition and intended use of goods.

If you transfer goods (hardware and/or software and/or technology as well as corresponding documentation, regardless of the mode of provision) delivered by us or works and services (including all kinds of technical support) performed by us to a third party worldwide, you must comply with all applicable national and international (re-)export control regulations.

If required for the purpose of conducting export control checks, you (upon request by us) shall promptly provide us with all information pertaining to the particular end customer, final disposition and intended use of goods delivered by us respectively works and services provided by us, as well as to any export control restrictions existing in this relation.

The products listed in this catalog may be subject to European/German and/or US export regulations. Any export requiring approval is therefore subject to authorization by the relevant authorities.

Errors excepted and subject to change without prior notice.

1) The text of the Terms and Conditions of Siemens AG can be downloaded at www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

Further information can be obtained from our branch offices listed at www.siemens.com/automation/partner**System Solutions for Industry
Interactive Catalog on DVD**

Catalog

Products for Automation and Drives, Low-Voltage Power Distribution and Electrical Installation Technology **CA 01****Building Control**

GAMMA Building Control ET G1

Drive Systems

SINAMICS G130 Drive Converter Chassis Units	D 11
SINAMICS G150 Drive Converter Cabinet Units	
SINAMICS GM150, SINAMICS SM150 Medium-Voltage Converters	D 12
SINAMICS PERFECT HARMONY GH180 Medium-Voltage Air-Cooled Drives Germany Edition	D 15.1
SINAMICS G180 Converters – Compact Units, Cabinet Systems, Cabinet Units Air-Cooled and Liquid-Cooled	D 18.1
SINAMICS S120 Chassis Format Units and Cabinet Modules	D 21.3
SINAMICS S150 Converter Cabinet Units	
SINAMICS DCM DC Converter, Control Module	D 23.1
SINAMICS DCM Cabinet	D 23.2
SINAMICS and Motors for Single-Axis Drives	D 31
SINAMICS G120P and SINAMICS G120P Cabinet pump, fan, compressor converters	D 35
Three-Phase Induction Motors SIMOTICS HV, SIMOTICS TN	D 84.1
• Series H-compact	
• Series H-compact PLUS	
Asynchronous Motors Standardline	D 86.1
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2
DC Motors	DA 12
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2
<i>Digital: SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units</i>	DA 22
SIMOVERT PM Modular Converter Systems	DA 45
SIEMOSYN Motors	DA 48
MICROMASTER 420/430/440 Inverters	DA 51.2
MICROMASTER 411/COMBIMASTER 411	DA 51.3
SIMODRIVE 611 universal and POSMO	DA 65.4

Note: Additional catalogs on SIMODRIVE or SINAMICS drive systems and SIMOTICS motors with SINUMERIK and SIMOTION can be found under Motion Control

Low-Voltage Three-Phase-Motors

SIMOTICS Low-Voltage Motors	D 81.1
SIMOTICS FD Flexible Duty Motors	D 81.8
LOHER Low-Voltage Motors	D 83.1
MOTOX Geared Motors	D 87.1
SIMOGEAR Geared Motors	MD 50.1
SIMOGEAR Gearboxes with adapter	MD 50.11

Mechanical Driving Machines

FLENDER Standard Couplings	MD 10.1
FLENDER High Performance Couplings	MD 10.2
FLENDER SIG Standard industrial gear unit	MD 30.1
FLENDER SIP Standard industrial planetary gear units	MD 31.1

Process Instrumentation and Analytics

Field Instruments for Process Automation	FI 01
<i>Digital: SIPART Controllers and Software</i>	MP 31
Products for Weighing Technology	WT 10
<i>Digital: Process Analytical Instruments</i>	PA 01
<i>Digital: Process Analytics, Components for the System Integration</i>	PA 11

Digital: These catalogs are only available as a PDF.

**Low-Voltage Power Distribution and
Electrical Installation Technology**

Catalog

SENTRON · SIVACON · ALPHA Protection, Switching, Measuring and Monitoring Devices, Switchboards and Distribution Systems	LV 10
Standards-Compliant Components for Photovoltaic Plants	LV 11
3WT Air Circuit Breakers up to 4000 A	LV 35
3VT Molded Case Circuit Breakers up to 1600 A	LV 36
<i>Digital: SIVACON System Cubicles, System Lighting and System Air-Conditioning</i>	LV 50
<i>Digital: ALPHA Distribution Systems</i>	LV 51
ALPHA FIX Terminal Blocks	LV 52
SIVACON S4 Power Distribution Boards	LV 56
<i>Digital: SIVACON 8PS Busbar Trunking Systems</i>	LV 70
<i>Digital: DELTA Switches and Socket Outlets</i>	ET D1

Motion Control

SINUMERIK & SIMODRIVE Automation Systems for Machine Tools	NC 60
SINUMERIK & SINAMICS Equipment for Machine Tools	NC 61
SINUMERIK 840D sl Type 1B Equipment for Machine Tools	NC 62
SINUMERIK 808 Equipment for Machine Tools	NC 81.1
SINUMERIK 828 Equipment for Machine Tools	NC 82
SIMOTION, SINAMICS S120 & SIMOTICS Equipment for Production Machines	PM 21
Drive and Control Components for Cranes	CR 1

Power Supply

Power supply SITOP	KT 10.1
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Safety Integrated

Safety Technology for Factory Automation	SI 10
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SIMATIC HMI/PC-based Automation

Human Machine Interface Systems/ PC-based Automation	ST 80/ ST PC
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SIMATIC Ident

Industrial Identification Systems	ID 10
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SIMATIC Industrial Automation Systems

Products for Totally Integrated Automation	ST 70
SIMATIC PCS 7 Process Control System System components	ST PCS 7
SIMATIC PCS 7 Process Control System Technology components	ST PCS 7 T
Add-ons for the SIMATIC PCS 7 Process Control System	ST PCS 7 AO

SIMATIC NET

Industrial Communication	IK PI
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SIRIUS Industrial Controls

SIRIUS Industrial Controls	IC 10
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Information and Download Center

Digital versions of the catalogs are available on the Internet at: www.siemens.com/industry/infocenter
There you'll find additional catalogs in other languages.
Please note the section "Downloading catalogs" on page "Online services" in the appendix of this catalog.

Get more information

All the latest information on field instruments for process automation can be found on the internet at www.siemens.com/processinstrumentation

Industrial Security

Siemens provides automation and drive products with industrial security functions that support the secure operation of plants or machines. They are an important component in a holistic industrial security concept. With this in mind, our products undergo continuous development. We therefore recommend that you keep yourself informed with respect to our product updates. Please find further information and newsletters on this subject at: <http://support.automation.siemens.com>

To ensure the secure operation of a plant or machine it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Any third-party products that may be in use must also be taken into account. Please find further information at: <http://www.siemens.com/industrialsecurity>

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